

THE
REPERTORY
PATENT INVENTIONS,

AND OTHER

Discoveries & Improvements

IN

ARTS, MANUFACTURES,

AND

AGRICULTURE;

BEING A CONTINUATION, ON AN ENLARGED PLAN,

OF THE

Repertory of Arts & Manufactures,

WORK ORIGINALLY UNDERTAKEN IN THE YEAR 1794, AND STILL CARRIED ON
WITH A VIEW TO COLLECT, RECORD, AND BRING INTO PUBLIC NOTICE,
THE USEFUL INVENTIONS OF ALL NATIONS.

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THE
REPERTORY

. PATENT INVENTIONS.

No. LXXIII. NEW SERIES.—JANUARY, 1840.

Specification of the Patent granted to JOSEPH CLISILD DANIELL, of Limpley Stoke, in the Parish of Bradford, in the County of Wilts, for an Improved Method of Weaving Woollen Cloths, and Cloths made of Wool, together with other Materials.—Scaled January 9, 1838.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Joseph Clisild Daniell, do hereby declare that my said invention is described and ascertained in manner following, and by the aid of the drawing hereunto annexed (that is to say):—

The object of my said improved method of weaving woollen-cloths, and cloths made of wool, together with other materials, is to render such cloths more suitable for warm garments, than cloths exhibiting the same fineness of texture and appearance would be, if they were woven in the usual manner. For cloths woven according to my said improved method, have one side or surface of the cloth covered with a covering composed of wool, or of other

suitable material, or of any suitable mixture of wool with other material, and which covering is produced by an additional weft-thread or shoot, composed of wool or other suitable material, or of any suitable mixture of wool with other material, that additional weft-thread or shoot passing alternately backwards and forwards across the width of the piece of cloth, without being drawn into the thickness of what I call the texture of the cloth, during the operation of weaving the same according to my said improved method. But the said additional weft-thread is applied wholly on one side or surface of that texture, in order to form a covering to that side or surface, which covering is in a distinct plane from that of the texture of the cloth ; and the said additional weft-thread is confined and kept in its intended place on the said surface, by being tied thereto, by causing some few of the warp-threads of the cloth to cross and pass round outside of the said additional weft-thread, so as to bind, tie on, or confine, the same to the cloth ; but the number (or proportionate number) of warp-threads, which are so caused to cross, or pass round, outside of the said additional weft-thread, is no more than is necessary for the purpose of binding, tying on, and confining, the said additional weft-thread in its intended place on the cloth, in order to form a covering thereto as hereinafter mentioned ; and the texture of the cloth, which is thus covered on one side, is formed by the mutual intercrossings of the ordinary weft-thread or shoot, with the several warp-threads, those two sorts of threads crossing over and under each other, in any such usual and regulated manner, as will produce a firm cloth texture of the desired quality, that texture being independent of, and in a distinct plane from, the additional weft-thread or shoot, which is to form the covering to one side of the cloth, for, as before explained, that additional weft-thread does not penetrate into the thickness of the texture of the cloth at all. And as to those few of the warp-threads, which do cross and pass

round outside of the said additional weft-thread, as before mentioned, for the purpose of tying on and confining that thread in place on the cloth, although those few warp-threads must occasionally, at intervals, bend out of, or quit, their usual and proper places in the plane of the thickness of the said texture of the cloth, in order to so cross and pass round outside of the said additional weft-thread ; nevertheless, the said few warp-threads do always return to their usual and proper places in the texture of the cloth, after having so crossed and passed round outside of the additional weft-thread ; and the said few warp-threads being only a small proportion of the whole number of warp-threads, the regularity of the texture of the cloth is not materially deranged by the said occasional bending of those said few warp-threads, out of their usual and proper places in the said texture, at such intervals as it is required for them to do so, in order to tie on, or confine, the additional weft-thread in place on one side of the texture of the cloth, and form a covering to that side, as before mentioned. Wherefore the texture of the cloth is, as before mentioned, formed by the mutual intercrossing, or interweaving, of the ordinary weft-thread, with the several warp-threads, excepting those few of the latter which are, for the time being, bended out of their proper places in the plane of the thickness of the said texture, but those same few warp-threads, at all other times, when they are not in the act of being so bended out of their said proper places, do participate with all the other warp-threads in forming the texture of the cloth, by mutually intervening with the ordinary weft-tread, according to any such suitable and regulated manner of interweaving of warp and weft threads together, as will form a firm woven cloth texture of the desired quality. And note, the adjacent shoots of the ordinary weft-thread, which shoots perform the said mutual interweaving with the warp threads, to form the texture of the cloth, ought to be disposed as much as possible at uniform distances apart,

shoot from shoot, in that texture, in order that the texture may be regular and uniform ; but the aforesaid additional weft-thread, which is to form the covering to one side of the cloth, ought to have as little influence as possible in keeping the adjacent shoots of the ordinary weft-thread apart, one shoot from the next, or in deranging the regularity of the distances between shoot and shoot of the said ordinary weft-thread. And as to the manner of performing my said improved method of weaving, the same must be varied according to the kind, quality, or variety of cloth that it is desired to produce ; and by way of example, I shall explain the manner of weaving, according to my said improved method, such varieties of cloth as will be most generally useful. For woollen cloths, which is to be milled or fulled, and then raised with a woolly pile, by dressing with teasles, or substitute for teasles, and then that pile to be cropped or shorn even and smooth on the surface, I employ nearly the same kind or quality of woollen warp-yarn, or chain, and of woollen weft-yarn, or shoot, for forming what I have hereinbefore called the texture of the cloth, as would be used in the ordinary mode of weaving such a quality of woollen cloth, as would exhibit nearly the same fineness of appearance on its face or front surface as the cloth woven according to my said improved method, will exhibit on its face or front surface ; *videlicet*, on that side thereof which is not covered with the covering hereinbefore mentioned. And for the additional weft, or shoot, which is to form that covering, I use woollen weft-yarn, or shoot, containing at least twice (and in some cases three times) the weight or quantity of wool in any given length that is contained in a like length of the ordinary weft, or shoot, which, as aforesaid, I use for what I have hereinbefore termed the ordinary weft, or shoot, of the texture of the cloth. And in weaving the same according to my said improved method, I throw one shoot of the said large or coarse additional weft-yarn for every two shoots of ordinary weft-yarn ; and I cause one-

fifth part of the whole number of warp-yarns to cross and pass round outside of each shoot of the said large, or coarse, additional weft-yarn, in order to tie on and confine the same in its intended place, so that it may form a covering to one side or surface of the cloth, as hereinbefore explained. And I form the texture of the cloth, by any such mutual interweaving and intercrossing of the ordinary weft-yarn, with the several warp-yarns, as will produce nearly the same firmness and stability of texture as would be produced in the usual mode of weaving woollen cloths, which is intended to exhibit the same degree of fineness of appearance on its face, or front surface, as the cloth woven according to my said improved method, is intended to exhibit on its face; that is to say, in the usual mode of weaving woollen cloths, the mutual intercrossings of the weft-yarns over and under the several warp-yarns, is so managed, as that a greater proportion of the weft-yarn, than of the warp-yarn, is thrown up, or rendered visible, on the front face of the cloth, in order that when a woolly pile is raised on that surface, the fibres of wool in the weft-yarn may so predominate in the said pile as to conceal and cover the yarns of the warp. And in like manner, and for the same object, in weaving such woollen cloth, according to my said improved method, a larger proportion of the weft-yarn, than of the warp yarn, may be brought up, or rendered visible, upon the front face of the cloth, which effect may be obtained by suitable management of the operation of the weaving, as is well known to weavers of woollen-cloths, in the usual mode of weaving, and like management may be used in weaving, according to my said improved method; or the mutual intercrossings that the ordinary weft-yarn, is to make over and under the several warp-yarns, may be so arranged that the ordinary weft-yarn will occasionally (but not always) pass over two adjacent yarns of warp, those occasions being as frequent as is requisite, in order to exhibit the intended predomi-

nance of the fibres of the wool of the weft, in the pile on the front face of the cloth. But note, this mode of obtaining such predominance is not a new practice in weaving woollen cloth, and is no part of my present invention; and the adjacent shoots of the ordinary weft will be disposed at regular distances asunder from shoot to shoot in the texture of the cloth, without sensible derangement of the regularity of those distances by the application of the large or coarse additional weft, which is to form the covering for the back surface of the cloth, and which additional weft is thrown across the said surface at every third time of throwing the shuttle, so that there will be two shoots of ordinary weft in the texture of the cloth for one shoot of the large, or coarse, additional weft in the said covering; but, nevertheless, owing to the larger size of the said additional weft, the adjacent shoots thereof may be made to fill up, one to another, on the back surface, so as to form a complete covering thereto. And when woollen cloth, woven, as above described, according to my said improved method, has been milled or felted in a fulling-mill, and its surfaces afterwards raised into a woolly pile, by operation of dressing with teasles, or substitutes for teasles, and then that pile being shorn even and smooth, according to the usual practice of milling, dressing, and finishing woollen cloths, the face or front of the cloth may, by suitable arrangement of the said usual practice, have the same appearance given to it, as might be given to the face or front surface of the woollen cloth woven in the ordinary mode, with warp and weft-yarns, spun of the same size and quality of wool, and of spinning as the warp and the ordinary weft which I use for the texture of the cloth, woven according to my improved method. But the back surface of the latter cloth being covered with a covering of the aforesaid large or coarse additional weft, that covering may be raised to a long soft pile, which will render the cloth very fit for making warm garments. And the said covering, although,

as hereinbefore mentioned, it is not drawn by the operation of weaving according to my improved method, into the thickness of the texture of the cloth, so as to penetrate that thickness, but is in a distinct plane from that of the said texture ; nevertheless, by the operation of the fulling-mill, the fibres of the wool, whereof the said large or coarse additional weft is composed, will become so far intermingled amongst, and felted to, the fibres of the wool whereof the warp and ordinary weft are composed, as to produce a strong adhesion of the said covering to the texture of the cloth, in addition to the adhesion produced in the weaving by the tying on of the additional large or coarse weft, which forms the said covering to the said texture, by causing every fifth of the warp-yarns to pass round and across each shoot of the large or coarse additional weft, as hereinbefore stated. And also, by the operation of the fulling-mill, the fibres of the wool, in the adjacent shoots of the additional large or coarse weft, may be so felted together as to produce a considerable lateral adhesion of those adjacent shoots, each one to its neighbour, and thus unite them more completely into a covering, which can be raised into a long soft woolly pile ; wherefore the said covering will give an addition of strength to the texture of the cloth, as well as render it fit for warm clothing. But the cloth, although its thickness is greatly augmented by the addition of the said covering to one side of it, is much more supple or pliable, and exhibits a finer face or surface than cloth of equal thickness and warmth, woven in the usual mode ; for then, as the whole thickness would be in the texture of the cloth, and the yarns of warp and weft, whereof it is woven, must be spun large, and the texture so composed of large yarns, will render the cloth far more stiff and rigid, and coarse on the surface, than cloth of equal thickness, woven according to my improved method, which has a thin and firmly-woven texture of fine-spun yarn for the warp, and for the ordinary weft, with a covering over one side, to obtain thickness

and warmth. The thickness thus obtained does not render the cloth stiff and rigid, or coarse in appearance, on the face or surface, but leaves it supple or pliable, and yet it is firm in its texture, because it is composed of fine yarns closely interwoven, warp and weft together. And woollen cloth, woven according to my said improved method, although of a firm and thin texture, owing to that texture being closely woven of fine-spun yarns for the warp, and for the ordinary weft; and although it exhibits a fine face or surface, it may, nevertheless, have the large or coarse additional weft for the covering for the back surface, spun out of a coarser and cheaper kind of wool than is proper to be used for spinning the finer yarns for the warp, and for the ordinary weft, which form the texture of the cloth; but that circumstance of being enabled to use coarser wool for forming the said covering, is no way essential to my improved method of weaving, for the additional weft which I use to form the said covering, may be spun out of the same kind of wool as is used for spinning the warp, and ordinary weft, or out of fur, beaver, hair, silk, or other suitable material, or out of any suitable mixtures of such materials; all which circumstances may be according to the sort of pile which is desired to be given to the covering of the cloth. And although it will in most cases be intended, that the said covering shall form the back face of the cloth, in which case the appearance exhibited by that covering is of less importance, nevertheless, that circumstance is not essential to my improved method, for the said covering may be the front or outside face of the cloth, in which case the material chosen for that covering, and the pile into which it is raised, and the finish given thereto must be managed according to the appearance the cloth is desired to present. And note, although the additional weft-yarn, which is to form the said covering to cloth woven according to my said improved method, has been hereinbefore stated to be a large and coarse weft, and, in particular cases, containing twice or three times

the quantity or weight of material in a given length that is contained in a like length of the warp, or of the ordinary weft, which is to form the texture of the cloth ; nevertheless, that circumstance is not essential to my said improved method, for the said additional weft may be of the same, or nearly the same, size as the ordinary weft. It is obvious that the covering which is formed by using a fine spun, or small size, additional weft, will not form so thick a covering to the cloth as will be formed by using a coarse spun, or large size, additional weft ; but it may in some cases be desirable to have a thin covering, and in other cases to have a thicker. And as to the loom which is to be used for my improved method of weaving, the same may be such as is commonly used for the usual mode of weaving, but it must be provided with the means of using two shuttles, in all cases when the additional weft, which, according to my improved method, is to form the covering to one side of the cloth, is to be of a larger size, or coarser, or of a different material, from the ordinary weft, which, by interweaving with the warp, is to form the texture of the cloth, for then one shuttle being filled with the ordinary weft, and the other with the additional weft, the loom must be adapted to use both those shuttles, so that either one of them may be drawn across the web in its turn, as is required, in order to lay or throw the shoots of each sort of weft at their intended intervals. And the loom must be provided with a sufficient number of heddles for operating upon the yarns of the warp, so as to open or divide the warp into a shed, which will admit a shuttle to pass therein, across the width of the warp, the treadles and gear, or harness, by which those heddles are wrought, being suitably arranged, so that at particular and appointed times of dividing the warp, and opening a shed therein, all the warp yarns, except one out of five of the whole number, will be raised up, and then it is that the shuttle, with the additional weft, is to be thrown across the width of the warp, in that shed which is so opened,

whereby a shoot of that additional weft will be laid beneath all the warp yarns, excepting those few of them which have not been raised by the heddles, and which few are kept down, in order that they may pass round, and tie on, the shoot of the additional weft, which has been just thrown, so as to retain the said shoot in its intended place, in part of the formation of a covering to the texture of the cloth. And then, after the throwing of the said shoot of the additional weft, and the beating up of that shoot by the usual motion of the reed, and of the lathe, then at the next succeeding time of opening the shed, the heddles must divide the yarns of the warp in a suitable manner for producing the texture of the cloth, that is, with a suitable number of yarns of the warp raised up, and a suitable number of them kept down, and then the shuttle, with the ordinary weft, is to be thrown across the width of the warp, in the shed which is so opened; whereby a shoot of that ordinary weft will be suitably laid in, between the divided warp yarns, to be in part of the formation of the woven texture of the cloth. And the said shoot of ordinary weft being beaten up by motion of the lathe, then the heddles divide the yarns of the warp anew, in a suitable manner, for continuing to form the texture of the cloth, and then the shuttle, with the ordinary weft, is thrown again to lay another shoot of that weft in further formation of the said texture, and after the said shoot of ordinary weft is beaten up by motion of the lathe, then the heddles divide the warp in the manner first mentioned; viz., by raising up all the warp-yarns, except one out of five of their whole number, and then the shuttle containing the additional weft is to be thrown, in order to lay another shoot of that additional weft in continuation of the formation of the covering to the texture of the cloth. And after the said shoot is beaten up, the heddles divide the warp suitably for continuing the texture of the cloth, and then the shuttle, containing the ordinary weft, is thrown again to lay another shoot thereof, and so on. And note, those warp-yarns, which are kept down when

the shoots of additional weft are thrown, and which warp-yarns are to perform the tying on of the said shoots to the texture of the cloth, may be supplied by a distinct yarn-beam from the ordinary yarn-beam, which supplies the other yarns of the warp. By thus having two yarn-beams, those yarns of the warp which perform the said tying on may (if the formation of the cloth requires) give out a greater length than the other warp-yarns give out, in the formation of a long piece of cloth. And by way of further explanation, I have hereunto annexed a drawing of a loom, which I have used for weaving woollen cloth, according to my said improved method, and have found to answer the intended purpose very well. It is a power-loom, deriving its motion from the power of steam or water, except the action of pecking or throwing the shuttle, which is performed by the workman who attends the operation of the loom. The names of the principal parts being written on the drawing, and being for the most part the same as in other power-looms (and therefore well known), it is not necessary to enter into a full description of every part, but only of those parts which are different from the corresponding parts of a similar loom, when used for weaving woollen cloths in the usual mode; and I shall describe the loom as being in the act of weaving one particular kind of woollen cloth, according to my said improved method; which kind I select by way of example, because I have made such cloth, and found it to answer. The warp for weaving the cloth is wound upon two warp-rollers, A and B, fig. 2, whereof one roller, A, contains three-fifths of the whole number of yarns in the warp, and the other roller, B, contains the other two-fifths of that number. The yarns from those two rollers are conducted up over a fixed horizontal rail, C, and after passing across that rail, are extended horizontally in the loom, and pass through the heddles, D, which are five in number, and then the yarns pass through the reed or slay, *a*, of the lathe, E, in the usual manner of all looms. The warp so extended is

woven by throwing shoots of weft across its width, and as fast as each such shoot is beaten up into its proper place by the action of the reed, *a*, the cloth is formed at *b*, which cloth passes over the breast-beam, *r*, and is wound up around the cloth-beam, or roller, *g*; that roller, *g*, has a pulley, *g*, upon one end of its axle, around which a cord, *d*, is wound, and the cord, *d*, being conducted by suitable pulleys, *e*, *e*, *e*, has a weight, *f*, suspended to one end of it in order to exert a constant tendency to turn the roller, *g*, round, and wind up the cloth as fast as it is formed. Note, when the weight, *f*, has descended near to the floor, it is wound up anew, by turning the pulley, *g*, round backwards by hand; for that pulley is not fixed fast on the axis of the cloth-roller, *g*, but is connected therewith by means of a ratchet-wheel, *h*, which is fixed on the axis, and a click belonging to the pulley, takes into the teeth of that ratchet, to turn the same, together with the roller, *g*, by the descent of the weight, *f*; but the ratchet and click allows the pulley, *g*, to be turned round the backward way, for winding up the weight when required. The two warp-rollers, *A* and *B*, have a sheave or pulley, *k*, *k*, fixed on each end of the roller, and around or over that sheave a strap is applied, one end of the strap being made fast to the framing of the loom, and the other end being drawn down tight on the sheave, by action of a loaded lever, *l*, *l*; these straps detain the yarn-rollers, *A*, *B*, from turning round easily, and, therefore, occasion tension on the yarns of the warp, in the act of pulling forward the yarn from off each roller, which is the usual manner of all looms; but the weights on the several loaded levers, *l*, *l*, must be duly regulated, so that all the yarns of the warp will be under a like tension, as well those yarns which come from the yarn-roller, *A*, as those which come from the yarn-roller, *B*. For the yarns proceeding from those two rollers, *A* to *B*, are intermingled together to form the warp, which, in counting across its width, consists of three neighbouring or adjacent yarns

proceeding from the upper yarn-roller, *A*, and then two adjacent yarns proceeding from the lower yarn-roller, *B*; then three from *A*; and then two from *B*; and so on across the whole width of the warp. The warp, so constituted, is equally divided amongst the five heddles, at *p*; that is to say, one of the yarns of the warp, which proceeds from upper yarn-roller, *A*, being threaded into the backmost heddle, 1, nearest to the yarn-rollers; then the next adjacent warp-yarn, which proceeds from the lower yarn-roller, *B*, is threaded into the next heddle, 2; then the next yarn, which also proceeds from the lower yarn-roller, *B*, is threaded into the next heddle, 3; then the next yarn, which proceeds from the upper yarn-roller, *A*, is threaded into the next heddle, 4; then the next yarn, which also proceeds from the upper yarn-roller, *A*, is threaded into the next heddle, 5, which is the farthest from the yarn-rollers, and so on; all the rest of the yarns of the warp are threaded into the five heddles by repetition of the above order, throughout the whole width of the warp. And the said five heddles are actuated by six treadles, *H*, placed side by side beneath the heddles, being all six moveable, about one fixed centre pin, *m*, and the front ends of the treadles, *H*, are connected by cords, with counters or levers, *M* and *N*, fig. 1, in such manner that each treadle, when pressed down, will pull up some heddles, and draw down others, as the progress of the weaving requires; that is to say, there are five counters, *M*, side by side, and five counters, *N*, side by side, answering to the five heddles, being one counter, *M*, and one counter, *N*, belonging to each heddle. Each of the six treadles, *H*, has five connecting cords proceeding upwards from the front end of it, some of which five cords are tied to some of the five counters, *M*, belonging to such of the five heddles as are to be pulled down by the action of the treadle, and the rest of the five cords are tied to those of the counters, *N*, which belong to the rest of the five heddles, being those heddles which are to be pulled up. For each of the counters, *M*,

is tied by a short cord to the lower shaft of the heddle to which it belongs, so that whenever a counter, *m*, is pulled down by a cord from any treadle, that action will cause the heddle belonging to that counter, *m*, to be sunk or pulled down. But the five counters, *n*, have five cords, *n*, proceeding up from them, between the yarns of the warp and amongst the heddles, but without interference with either, to the inner ends of ten leavers or jacks, *p*, *q*, which are suspended by their centres, *p*, *q*, from the ceiling over the looms. Each of the five cords, *n*, have two branches to connect it to two jacks, *p*, *q*, as seen in fig. 1. There are five jacks, *p*, and five jacks, *q*, side by side, being one jack, *p*, and one jack, *q*, to each of the five heddles, and from the outer ends of each jack, *p* and *q*, a cord, *r*, *r*, descends to the upper shaft of the heddle to which the two jacks belong, wherefore the two jacks, *p* and *q*, belonging to each heddle, cause that heddle to be raised or pulled up, whenever the counter, *n*, belonging to the same heddle is pulled down, because the cord, *n*, which goes up from that counter, *n*, is tied to the inner ends of the two jacks, *p* and *q*, whilst the heddle is suspended by the cords, *r*, *r*, from the outer ends of the same jacks, whereof the centres of motion are at *p* and *q*. The above mode of connecting the treadles with the heddles by means of counters and jacks, so as to enable each treadle to pull down some heddles, and, at the same time, to pull up all the other heddles, is in common use, and well known amongst weavers; and the same effect may be produced in other ways of connecting the treadles and heddles, which being understood, the arrangement of the several cords from each of the treadles to the several counters for this particular instance of weaving woollen cloth according to my improved method, is as follows. Supposing the six treadles, *h*, to be numbered, as in figs. I, III, and IV, the numbers 1, 2, 3, 4, 5, and 6, there marked on the several treadles, will denote the order of succession in which the six treadles are to be pressed down, one after another, at

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each succeeding time of opening the warp into a shed. Treadle 1, is tied by three of its five cords, to the pull-down counters, *m*, belonging to the 1st, 2d, and 5th heddles, and is also tied by the other two of those five cords, to the pull-up counters, *n*, belonging to the 3rd, and 4th heddles. Treadle 2, is tied by three of its cords to the pull-down counters, *m*, belonging to the 2nd, 3rd, and 4th heddles, and by its other two cords to the pull-up counters, *n*, belonging to the 1st and 5th heddles. Treadle 3, is tied with one of its cords to the pull-down counter, *n*, belonging to the 2nd heddle, and is tied by its other four cords, to the pull-up counters, *m*, belonging to the 1st, 3rd, 4th, and 5th heddles. Treadle 4, is tied by three of its cords to the pull-down counters, *m*, belonging to the 1st, 3rd, and 5th heddles, and by its other two cords to the pull-up counters, *n*, belonging to the 2nd and 4th heddles. Treadle 5, is tied by three of its cords to the pull-down counters, *m*, belonging to the 2nd, 3rd, and 4th heddles, and by its other two cords to the pull-up counters, *n*, belonging to the 1st and 5th heddles. Treadle 6, is tied by one of its cords to the pull-down counter, *m*, belonging to the 3rd heddle, and is tied by its other four cords to the pull-up counters, *n*, belonging to the 1st, 2nd, 4th, and 5th heddles. In the loom represented in the drawing, the six treadles, *h*, are pressed down one after another in succession by six tappets, on four revolving tappet-wheels, *r*, *r*, *r*, *r*, which are fixed side by side on a horizontal axis, *s*; that axis is turned round by a spur cog-wheel, *t*, on one end of it, the teeth of which are engaged by the teeth of a pinion, *t*, on the end of the axis, *v*, of the two cranks, *v*, *v*, of the loom; those cranks, by their rods, *w*, *w*, actuate the lathe, *x*, to move the same, together with the reed or slay, *a*, and the shuttle-race, *w*, alternately backwards and forwards in the usual manner of power-looms; but the cog-wheel, *t*, having six times as many teeth as the pinion, *t*, the wheel, *t*, and its axis, *s*, makes one turn for six times of beating up the

weft by the motion of the lathe, and there being six tappets disposed around the four tappet-wheels, *a*, *a*, on the axis, *s*, one of those six tappets is brought into action on one of the treadles, *n*, as shewn in fig. *ii*, in order to press the same down every time when it is required to open the warp into a shed, in preparation for throwing a shuttle across the warp in that shed. The four tappet-wheels, *a*, are disposed in the intervals between the treadles, 2, 4, 6, and 5, 3, 1. The two middlemost of the four tappet-wheels, *a*, have a tappet on each side of each wheel for pressing down the four treadles, 4, 6, 5 and 3. The two outermost tappet-wheels, *a*, have a tappet on only one side of each wheel, for pressing down the two treadles, 2 and 1. The several tappets are arranged on their respective wheels, *a*, so as to press down the treadles, *n*, one after another in the order of the numbers, 1, 2, 3, 4, 5, and 6, which are marked upon them in figs. *i*, *iii*, and *iv*. The packing or throwing of the shuttle is, as already mentioned, performed by the hand of the person who attends the loom; he holds the handle, *x*, of the pecker-string, *x*, in his hand, and by snatching that handle one way or the other, at the precise moment when the warp has been properly opened by the action of the heddles, he gives such motion to the pecker, as will throw the shuttle along the shuttle-race, *w*; which mode is the same as usual in hand-loom, and requires no further description; but in this particular case of weaving woollen cloth according to my said improved method, two shuttles must be used, one for throwing shoots of ordinary weft for interweaving with the warp threads to form the texture of the cloth, and the other for throwing shoots of the additional weft to form the covering to the underside of the cloth; for this purpose, the shuttle boxes, 20, 20, at each end of the shuttle-race, *w*, are made double, with a partition in the middle of each box, to divide it into two cells, for the reception of two shuttles side by side, each cell having its pecker sliding on a spindle, fixed over the mid-

dle of that cell. When the shuttle-boxes, 20, are in the positions represented in fig. III., they are prepared for throwing shoots of ordinary weft, because that shuttle which is charged with ordinary weft, is lodged in the frontmost cells of the shuttle-boxes, and those cells are in the line of the shuttle-race, w, at each end thereof. The pecking-handle, x, and string, x, is used to throw the shuttle of the ordinary weft backwards and forwards across the warp, and that shuttle is so thrown at every time, that the treadles, 1 and 2, 4 and 5, are pressed down, because at those times, the warp is opened in a proper manner for receiving shoots of the ordinary weft, so as to form the texture of the cloth. But every time that treadle 3, and treadle 6, is pressed down, then the other shuttle, containing the additional weft, requires to be thrown. That additional shuttle is lodged in the backmost cells of the two shuttle-boxes, 20, and is thrown by the peckers of those cells, when the additional pecker-string, 21, of those peckers, is snatched by the weaver, who lets go the ordinary pecking-handle, x, and takes hold of another additional pecking-handle, 22, for that purpose. But before the additional shuttle can be thrown, both the shuttle-boxes must be moved forwards so much in respect to the lathe, x, as will bring the two backmost cells of those shuttle-boxes into the line of the shuttle-race, w, at each end thereof, instead of the two frontmost cells. To admit of thus bringing forwards the shuttle-boxes, 20, 20, they are each mounted on two straight spindles, 23, 23, which are fixed horizontally across the end of the shuttle-race, w, and the boxes, 20, 20, are mounted cross ways on those spindles so as to slide thereon. When the boxes are slid backwards as far as they will go on their spindles, 23, 23, then their frontmost cells, with the ordinary shuttle, are in the line of the shuttle-race, w, at each end thereof, as is shewn in fig. III.; but when the boxes, 20, 20, are slid forwards on their spindles, 23, as far as they can come forwards, then the

backmost cells, with the additional shuttle, will be brought into the line of the shuttle-race, *w*, at each end thereof, as is shewn in fig. V. At all times, when it is required to have the shuttle-boxes backwards, as in fig. III., they are put back by two springs, 24, 24, which are affixed to the breast-beam, *F*, and project horizontally so far backwards therefrom, that the frontmost sides of the shuttle-boxes, 20, 20, will be brought in contact with the ends of those springs, 24, 24, every time that the lathe, *E*, is brought forwards for beating up the weft, and the elastic reaction of those springs will bear the boxes, 20, 20, as far backwards on their spindles, 23, 23, as they can go. Small springs may be applied beneath the boxes, 20, to press laterally against their spindles, 23, 23, so as to cause friction, which will prevent those boxes moving too easily on their spindles, wherefore the boxes will keep backwards thereon, as represented in fig. III., as long as they are required to do so; but when the boxes, 20, 20, are required to be slid forwards on their spindles, 23, in the manner above described, then two upright blades or stems, 25, 25, are raised up so much, that their upper ends (which were previously below the level of the shuttle-boxes, 20, 20) will intercept the shuttle-boxes, 20, 20, at their backmost sides, when the lathe, *E*, is carried about half way backwards in preparation for a shuttle being thrown; and in consequence of the shuttle-boxes, 20, 20, being so intercepted by the upper ends of the blades, 25, 25, the boxes will be detained from moving backwards along with the lathe, *E*, which is then moving backwards, whereby the boxes will be moved on their spindles, 23, as far as they can come forwards thereon, so that each box, 20, will assume the position shewn in fig V., in respect to the shuttle-race, *w*; but as that is performed before the lathe, *E*, has ceased to move backwards, the blades, 25, 25, will give way backwards, in order to permit the further motion of the boxes, 20, 20, with the lathe, after those boxes have come forwards on their spin-

dles, 23, as shewn in fig. V. The blades, 25, may be rendered yielding by their own flexibility, or they may be kept drawn forwards, by small cords passing over pulleys, 26, 26, fig. III, and having weights suspended to the ends of these cords, wherefore when the upper ends of the blades, 25, first intercept the shuttle-boxes, 20, 20, as above stated, they will resist going backwards sufficiently to detain the boxes, and cause them to assume the position, fig. V. ; but when they are in that position, they can come no farther forwards on their spindles, 23 ; and then it is that the blades, 25, 25, give way backwards, as before mentioned. And in order to raise up the blades, 25, 25, when required, their lower ends are fitted into grooves in pieces, 30, 30, standing up from the floor, and those lower ends are connected by joint pins, with the outermost ends of two long levers, 27, 27, which are poised on centres, 29, 29, supported from the floor, and their innermost ends, which approach end to end, are united by a joint at 28, wherefore either lever, 27, being pressed down, at or near to its end, 28, the outer ends of both levers, 27, 27, will act together on the two blades, 25, 25, to raise the same, as already mentioned, so much up, that the upper ends of those blades will intercept the two shuttle-boxes, 20, 20. But if the ends, 28, of the two levers, 27, 27, are left at liberty, then the blades, 25, 25, will sink down so much as to keep out of the way of the boxes, 20, 20, which will pass over the upper ends of the blades, 25, 25. The ends, 28, of the two long levers, 27, 27, come opposite to the ends of the six treadles, H : and treadles, 3 and 6, are longer than the others, in order that those two (but none of the other treadles) may reach forwards over the ends, 28, of the levers, 27, 27, in such manner that whenever treadle 3, (or treadle 6) is pressed down, at which time it is that the shuttle containing the additional weft requires to be thrown, then the ends, 28, of both levers, 27, 27, will be pressed down, and both blades, 25, 25, will be raised up,

so that by intercepting the two shuttle-boxes, 20, 20, at their backmost sides, when they are moving backwards with the lathe, those boxes will be brought forwards on their spindles, 23, 23, from their position, fig. III., to their position, fig. V., when the backmost cells of the boxes, 20, 20, which receive the shuttle for the additional weft, are brought forward into the line of the shuttle-race, w, at each end thereof; which being done, then the weaver, having taken hold of the additional pecking-handle, 22, gives a snatch thereto, in the proper direction, and at the proper moment for throwing the shuttle, and thereby he throws the shuttle with the additional weft, in order to lay a shoot thereof; and as soon as treadle 3, or treadle 6, (as the case may be,) is released, then the levers, 27, 27, being also released, the two blades, 25, 25, sink down, as before mentioned, so as to be out of the way of the two shuttle-boxes, 20, 20: and when the lathe, x, is moving forwards, in order to beat up the shoot of additional weft, the two springs, 24, 24, will intercept the frontmost sides of the two shuttle boxes, 20, 20, when they are in their position, fig. V., and by detaining them from coming forwards, the two shuttle-boxes, 20, 20, will be restored to their position, fig. III., ready for throwing the shuttle containing the ordinary weft; and which position they will retain, until the two shoots of that weft have been thrown, and then the end, 28, of the two levers, 27, is again pressed down, by treadle 6, or treadle 3, (as the case may be,) in preparation for throwing another shoot of additional weft. The loom is put in motion by an endless strap and pulley, z, which is fitted on the end of the axis, v, of the cranks and the central part of the pulley, z, is a clutch-box, with several teeth, which, on sliding the pulley, z, along the axis, v, by means of a lever, z, engage with the teeth of a corresponding clutch-box on the axis, in order to turn that axis, and work the loom; but, when by means of the lever, z, the pulley, z, is slid along its axis so far as to separate the teeth of one clutch-box from those of the

other, then the loom will stop, the pulley, *z*, slipping round on the axis, *v*, without turning it. *x*, is a rod or handle extending from the front end of the lever, *z*, along the front of the loom, to enable the weaver to start it into motion, or stop it at pleasure. The loom being as above described, its operation is as follows: when treadle 1, is pressed down, it pulls down the first, second, and fifth heddles, and raises up the third and fourth heddles, whereby the yarns of the warp are opened into a shed, in a suitable manner, for receiving a shoot of ordinary weft in part of the formation of the texture of the cloth; and accordingly, the ordinary shuttle is thrown, by the weaver snatching the ordinary pecking-handle, *x*, at the proper moment; the two shuttle-boxes, 20, 20, being at the time in their position, fig. III.; and then, after that shoot has been beaten up into its place at *b*, fig. II., as part of the texture of the cloth, treadle 2, is pressed down, which pulls down the second, third, and fourth heddles, and raised by the first and fifth heddles; that manner of opening the warp is suitable for receiving another shoot of the ordinary weft, in further part of the formation of the texture of the cloth, and accordingly, the ordinary shuttle is thrown again across the width of the warp (but in a contrary direction to the last shoot) by another but contrary snatch of the ordinary pecking-handle, *x*; and when that shoot has been beaten up, then treadle 3, is pressed down, which pulls down only the second heddle, but raises up the first, third, fourth, and fifth heddles. Note, the second heddle contains every fifth yarn in the warp, and those yarns come from the lower or additional warp-roller, *B*. This manner of opening the warp is suitable for receiving a shoot of additional weft, in part of the formation of the intended covering to the underside of the cloth; and accordingly, the shuttle containing that additional weft is thrown across the warp, by giving a snatch to the additional pecking-handle, 22. Note, a moment before doing that, the two shuttle-boxes, 20, 20, had been re-

moved from their previous position, fig. III, to their position, fig. V., by action (in manner already described) of the upper ends of the blades, 25, 25, which ends were raised up (so as to intercept the two boxes, when the lathe was moving backwards) in consequence of treadle 3, pressing down the end, 28, of the two levers, 27, 27 : and when by motion of the reed, *a*, with the lathe, *ε*, the said shoot of additional weft is beaten up, it drives forwards underneath the two preceding shoots of ordinary weft, which have been thrown and beaten up, and which shoots formed so much of the texture of the cloth, and a corresponding length of cloth was taken up by the cloth-roller, *α*, at the time of beating up those shoots of ordinary weft ; but the shoot of additional weft, when beaten up, forms so much of the covering for the underside of the cloth, without adding to the length of the texture of the cloth ; and consequently, no cloth is taken up by the cloth-roller, *α*, in consequence of the beating up of the said shoot of additional weft. And after that beating up, treadle fourth is pressed down, which pulls down the first, third, and fifth heddles, and raises up the second and fourth heddles, which is suitable for receiving another shoot of ordinary weft in continuation of the texture of the cloth. Note, the shuttle-boxes, 20, 20, were removed from their position, fig. V., and restored to their position, fig. III., by meeting the two springs, 24, 24, at the last time of beating up ; and the blades, 25, 25, having dropped down again as soon as treadle 3, was released, the boxes, 20, 20, retain their position, fig. III. The said shoot of ordinary weft being thrown by a snatch of the ordinary pecking-handle, *x*, and that shoot being beaten up, then treadle 5, is pressed down, which pulls down the second, third, and fourth heddles, and raises up the first and fifth heddles, which is suitable for receiving another shoot of the ordinary weft ; and that is thrown by a contrary snatch of the ordinary pecking-handle, *x* ; and when that shoot is beaten up, then treadle 6, is pressed down, which

pulls down only the third heddle, but raises up the first, second, fourth, and fifth heddles. Note, the third heddle contains every fifth yarn in the warp; and those yarns come from the lower warp-roller, *B*; all which is suitable for receiving a shoot of additional weft. And note, treadle 6, by pressing down the ends, 28, of the levers, 27, raised the blades, 25, 25, so that they will intercept the shuttle-boxes, 20, 20, as the lathe is moving backwards, and thereby change the boxes, 20, 20, (in manner already described) from their position, fig. III., to their position, fig. V., and then the weaver, by a snatch of the additional pecking-handle, 22, throws the shuttle containing the additional weft across the warp. The shoot of that weft, when beaten up, drives forwards under the two preceding shoots of ordinary weft, which are in the texture of the cloth; the shoot of additional weft thereby forms so much of the covering for the underside of the cloth, but no cloth is taken up by the cloth-roller, *C*, in consequence of the beating up of the said shoot of additional weft. And at that time of beating up, the springs, 24, 24, meet the two shuttle-boxes, 20, 20, and put them back from their position, fig. V., to their position, fig. III. And now all the six treadles having been pressed down in succession, treadle 1, is pressed down again, and the operation of weaving, according to my said improved method, goes on in exact repetition of what has been explained. And note, the same aforesaid explanation will serve for the manner of weaving, according to my said improved method, by a hand-loom, the weaver then pressing down the treadles with his feet, and moving the lathe and throwing the shuttles with his hands, but performing all the operation in the order already described. The six treadles for such a hand-loom may be arranged as in the foregoing description, in which case the weaver will press his feet upon the points or extremities of those treadles. And note, the foregoing description is only given by way of an example of my improved method of

weaving woollen cloths. The texture of the cloth that is composed of the interweavings of the ordinary weft yarn over and under the warp yarns, in manner hereinbefore explained, "is such, that the front or upper face or surface of the cloth, will exhibit a larger proportion of that ordinary weft yarn than of the warp yarns, for by the action of the five heddles (which have the whole number of warp yarns divided equally amongst them), three of the warp yarns out of every five will be pulled down, and the other two of those five will be raised up, at every time when the shed is opened for throwing in a shoot of the ordinary weft ; viz., when treadles, 1 and 2, and treadles, 4 and 5, are pressed down. But that circumstance, and the manner whereby the yarns of the warp are interwoven with those of the ordinary weft, for composing the texture of the cloth, forms no part of my invention, and may be varied to suit the kind or sort of cloth that is required. It is the introduction of the shoots of additional weft in such manner, so as to form a covering to the under side of the cloth that distinguishes my improved method of weaving ; for instance, in the foregoing description, whenever a shoot of additional weft is about to be thrown, only one out of five of the whole number of warp yarns is pulled down, but four out of five are raised up, and the shoot of additional weft is laid under those four ; viz., when treadle 3, and treadle 6, is pressed down. And the one out of every five of the warp yarns, which remain under each shoot of additional weft (and which are supplied from the additional yarn-roller, B), although they are sufficient to retain and tie on that shoot to the underside of the texture of the cloth, they will not draw the said shoot up into the thickness of that texture, and, therefore, when the said shoot is beaten up, or driven forwards by action of the reed, it passes under the thickness of the texture of the cloth, in manner already explained, so as to form a covering to the underside thereof. And note, although in the foregoing description, one out of the five of the whole number of

yarns of the warp is pulled down, when a shoot of additional weft is to be thrown ; nevertheless, that proportion may be varied, preferring in all cases to have as small a proportionate number of the yarn of the warp pulled down as is consistent with the obtaining of an efficient tying on of the shoot of additional weft yarn to the underside of the texture of the cloth, by those few warp yarns which do pass round under the said shoot for that purpose ; and the fewer of them the better. And note, although in the foregoing description the covering formed by the shoots of additional weft are at the underside of the cloth, as it is woven in the loom, nevertheless the side of the cloth on which the said covering is woven may be the upper side when the cloth is in the loom, if the weaver prefers to have it so, and if he disposes his heddles and their harness in a suitable manner for so doing. And note, it has been before stated, that the additional weft which is introduced into cloth, woven according to my said improved method, in order to form a covering to one side thereof, may not in all cases require to be a large or coarse additional weft, as is the case in the foregoing description ; and if in any case the additional weft, which is to form the covering to one side of the cloth, should be spun of the same size or fineness, and of the same material as the ordinary weft which enters into the woven texture of the cloth, so that there is no difference in the yarn used for the ordinary weft, and for the additional weft, then it may not be necessary in such cases to use two shuttles, as hereinbefore described ; but the same shuttle being thrown regularly backwards and forwards across the warp, as in the usual mode of weaving, may serve to supply the shoots of ordinary weft, which are to form the texture of the cloth, and then in turn to supply the shoot of what has been hereinbefore called the additional weft, which is to form the covering to one side of that texture ; that is to say, when the warp is opened into a shed, which is suitable for receiving a shoot of weft, so as to combine the warp by that shoot of weft into a firmly woven cloth tex-

ture ; as for instance, in the foregoing description, when treadles, 1 and 2, and 4 and 5, are pressed down, the shoot of weft, thrown at such times, will contribute to the formation of so much length of that texture as belongs to one shoot of weft, but when a large proportion, such as four out of five, for instance, of the whole number of yarns in the warp are raised up, leaving only one out of five down ; as for instance, when treadles, 3 and 6, are pressed down, then the shoot of weft that is thrown at such times, when driven forwards by the lathe, will pass under the texture of the cloth, so as to form the covering to the underside thereof, as hereinbefore explained, and that effect of the additional weft being driven under, instead of into, the texture of the cloth, so as to form a covering, instead of going into the texture, will take place when the additional weft (or weft which is to form the covering) is of the same size as the ordinary weft (or weft which is to enter into the texture), as well as when the said additional weft is a larger and coarser spun yarn, than the said ordinary weft. And note, whereas the operation of the heddles in the foregoing description is such as to pull down three out of every five yarns of the warp, and raise up the remaining two of those five, whereby, as before stated, a larger proportion of ordinary weft yarn than of the warp yarns, will be exhibited on the front or upper surface of the cloth ; and although that circumstance may be varied without departing from my invention, nevertheless it should be remarked, that in cases when the wool or other material, which is used for the additional weft, which, according to my improved method, is to form the covering to one side of the cloth, is of a very different nature, or colour, or of a coarser and inferior quality to the wool which is used for the ordinary weft, which enters into the texture of the cloth, and which is to predominate in the pile on the front face thereof, then the aforesaid circumstance of the operation of the heddles causing a larger proportion of the warp yarns to be pulled down, than are pulled up, when the shoots of ordinary weft are to be

thrown for forming the texture of the cloth, becomes of importance to be observed in my improved mode of weaving; because the shoots of additional weft, which form the covering, being laid in contact with a larger proportion of the warp yarns, than of the ordinary weft yarn, the fibres of the coarse wool or other material, which forms the covering, will not, by operation of the fulling-mill, make their way through the texture of the cloth, so as to be apparent on the front face thereof, or not in the same degree as they might do, if the shoots of additional weft, which form the covering, were not laid in contact with a larger proportion of warp yarns, than of the ordinary weft yarn, as aforesaid. And note, although in the foregoing description it has been stated, that the shoots of additional weft, which, according to my said improved method, are to form the covering to one side of the texture of the cloth, are disposed one such shoot to every two shoots of ordinary weft, which is to enter into that texture, nevertheless, in case of the additional weft, which is to form the covering, being spun of the same (or nearly the same) size as the ordinary weft, which is to enter into the texture of the cloth, then such additional weft (or weft which is to form the covering) may be laid or thrown across the warp as frequently as the ordinary weft (or weft which is to enter into the texture) is so thrown; that is to say, of the successive shoots which are made one after the other during the progress of weaving, there will be first a shoot of ordinary weft, and then a shoot of the additional weft, and so on continually. And the said two wefts may be of different qualities, colours, or materials; but the operation of the heddles must be so arranged, as that they will pull down a much larger proportion of the whole number of yarns in the warp than they pull up, whenever the warp yarns are opened by the heddles into a shed in preparation for throwing a shoot of ordinary weft; and likewise, the heddles must pull up a much larger proportion of the whole number of warp yarns than they pull down, whenever the warp yarns are

opened by the heddles into a shed, in preparation for throwing a shoot of the additional weft. And the operation of the heddles during a short series of succeeding times of so opening the warp, must be such, as that all the threads in the warp will in their turn (sooner or later) during such short series, have taken their due share of action in being pulled up, when a shoot of ordinary weft is about to be thrown ; or in being pulled down when a shoot of additional weft is about to be thrown. And in every such case, when the said two wefts are different in size, or quality, or material, two shuttles must be used for containing the two kinds of weft, which shuttles may be applied in manner hereinbefore described, except that they must be adapted to be thrown alternately, or by turns, first one and then the other ; and in order to enable the mechanism hereinbefore described, and marked, 25, 25, 27, 27, 28, in the drawing, to operate in that manner, half the whole number of treadles, H, which are used in the loom, must be so much longer than the other treadles, as to reach over the ends, 28, of the levers, 27, 27, in the same manner and for the same purpose, as has been hereinbefore described, respecting treadle 3, and treadle 6, figs. III. and IV., and the said long treadles must be those treadles which, when pressed down, will cause the heddles to open the warp into a suitable shed, for receiving a shoot of the additional weft. And note, woollen cloth woven in the manner last described, with the shoots of additional weft, as frequent and numerous as the shoots of ordinary weft, will not admit of being woven into such a firmly woven texture of cloth, as woollen cloth woven in the manner described by reference to the drawing, (that is, with only one shoot of additional weft to every two shoots of ordinary weft) can be woven into. And my said improved method of weaving, as hereinbefore described, applies not only to the weaving of what are commonly called woollen cloths, and which are composed wholly of wool, both for warp, and for weft, but also to the weaving of cloths made of wool, together with other materials, which

have been or may be used together with wool, for the making of cloth, such for instance as fur, hair, beaver, silk, or other fibrous material, which admits of being intermixed with wool during the operation of carding, before the mixture of fibres is spun into yarn; and yarn spun out of such intermixed fibres may be used either for the warp or for the ordinary weft of cloth which is woven according to my said improved method, or for what I have hereinbefore termed the additional weft, which is to form a covering for one side of cloth woven according to my said improved method; or yarns spun entirely out of wool, or out of fibres of wool mixed with fibres of other suitable material, may be used for part of the yarns used in weaving cloth according to my said improved method, whilst other yarns used in the same cloth, are spun (without admixture of wool) out of other materials not commonly called wool, such as hair, down, beaver, silk, or yarns of silk, worsted, cotton, or flax, or other suitable material commonly called wool, may be used for the warp, or for the chain of cloth woven according to my said improved method, together with yarns of wool, for the ordinary weft, which is to form, or enter into, the texture thereof, and together with yarns spun of wool, mixed with fibres of other suitable material for the additional weft, which is to form a covering to one side of the cloth; or the said additional weft may be spun out of any suitable material not commonly called wool.

Having now described my said improved method of weaving woollen cloths, and cloths made of wool, together with other materials, I, the said Joseph Clisild Daniell, do hereby declare, that the new invention whereof the exclusive use is granted to me by the said letters patent, consists in the method, hereinbefore described, of introducing into woollen cloths, and cloths made of wool, together with other materials, an additional weft yarn, or shoot, which forms a covering to one side or surface of the cloth, that covering being in a distinct plane from the thickness of the texture of the cloth, by which I mean (as

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hereinbefore explained) the texture that is formed by the interweaving of the ordinary weft yarn, with the warp yarns, the said covering being only tied on, or bound to, the said texture, by causing such a small proportion of the whole number of warp yarns, to pass round outside of each shoot of the said additional weft, as is requisite for effectually tying on the said covering. And the said additional weft, whereof the said covering is composed, may (as hereinbefore stated) be spun out of a different quality of wool (or out of a different material) from the wool (or the mixture of wool with other material) whereof the warp and the ordinary weft for the texture of the cloth is spun; and the said additional weft may (as hereinbefore explained) be spun into a coarser or larger size yarn, than the said ordinary weft (or the warp) is spun into. Wherefore by such difference in fineness and coarseness of the material for the said additional weft, and in the size to which that weft is spun, the covering formed as aforesaid by that weft, according to my said improved method, on one side of the cloth, may (if desired) be of a coarse nature for warmth, and may have a long soft pile, whilst the other side or face of the same cloth exhibits a fine and closely-woven texture, and may have a fine and short pile.—In witness whereof, &c.

Enrolled July 9, 1839.

Specification of the Patent granted to JOHN POTTER, of Ancoats, Manchester, in the County of Lancaster, Spinner, and WILLIAM HORSFALL, of Manchester, aforesaid, Card Maker, for an Improvement or Improvements in Cards for Carding various Fibrous Substances, part of which Improvements may be used as a Substitute for Leather.—Sealed April 20, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso,

We, the said John Potter and William Horsfall, do declare the nature of our invention of an improvement or improvements in cards for carding various fibrous substances, part of which improvements may be used as a substitute for leather, to consist in the manufacture of a new material or substance for receiving the wire-teeth which have hitherto for the most part been set in leather, and we shall now proceed to describe the manner in which the same is to be performed and carried into effect. In the first place, we provide a woven fabric, of a peculiar construction, which we manufacture as follows: we make the warp or chain of a material possessed of the greatest possible strength, and the least elasticity, such as yarn or thread, made of flax, hemp or cotton, which yarn or thread we prefer to be made of two or three folds or strands doubled and twisted together. The warp being in the loom, it is to be made into cloth, by being shot or wefted with woollen-weft, that is with yarn or thread composed of sheep's wool. The cloth being woven, it is next to be cleansed or scoured, so as to free it from any oil or other impurities, and milled, by which latter process the fabric is brought to the requisite thickness or substance, by being milled up in width, or in the direction of the thread or yarn of wool. By this means we obtain a cloth capable of resisting a very considerable strain or tension in the direction of the warp, whilst the body of the cloth itself remains exceedingly soft and porous. We find that for most kinds of cards cloth milled up to such a thickness, as that one yard in length by twenty-seven inches in width shall weigh from fourteen to sixteen ounces avoirdupois, is the most suitable, though it will be evident that these proportions may be varied as circumstances may require. The middle qualities of sheep's wool we consider most suitable for making this description of cloth, being preferable to either the finest or coarsest sorts. To persons engaged in the woollen manufacture, these instructions will be sufficient to enable them to make the cloth. If

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the cards to be manufactured are intended for fillet-cards, the cloth is next to be torn up lengthwise of the piece into strips of a suitable width, but if sheet cards are intended, the cloth is to be cut crosswise, or in the direction of the weft, making the usual allowance as when using leather for the space on each side for the purpose of affixing the wire cards to the cylinder of the carding-engine, a sufficient number of these short pieces of cloth are to be sewn together at the ends, so as to form a fillet or belt by which the subsequent operations will be facilitated. The cloth thus prepared is passed through a solution of India-rubber, known to the trade as India-rubber-varnish or cement, and in the passing of the fabric, a quantity of the varnish will adhere to the surfaces; and the fabric, in this state, is wound tightly up, and allowed to stand a few minutes, then is unrolled and passed a second time through the varnish, by which means a still further portion of the India-rubber varnish will adhere to the cloth, and being again tightly wound up, it is to remain a sufficient length of time to allow the varnish to penetrate or become absorbed by the cloth. It is usually necessary to pass the cloth a third time through the varnish, after which we generally find that the cloth is saturated, and being again left as before in the coil, the whole mass becomes equally and completely penetrated by the varnish. Its being in this state may be known by the cloth assuming a semi-transparent appearance. The coil of cloth is then unwound and exposed to the atmosphere, so as to allow the varnish to dry, after which it is to be drawn once or twice through the varnish, by which the cloth will imbibe a further portion of it, so as to fill up the pores or interstices which the operation of drying has left open. If this process has been properly conducted, the fabric will now consist of nearly one third caoutchouc or india-rubber, and two thirds cloth by weight, but these quantities may be varied. The india-rubber or caoutchouc varnish or cement being an article that may be freely purchased, and

the modes of preparation being well known, it is unnecessary further to particularize it. The preparation of our improved material being thus far completed, we next cover it on each side with a mixture of ochre and weak size, which by destroying the adhesiveness of the India-rubber, facilitates the subsequent operation of inserting the wire-teeth, and also gives to the fabric more of the appearance of leather. When this coating is dry, the compound fabric produced by the operation above specified, is to be passed between a pair of weighty rollers, or otherwise submitted to considerable pressure, by which means the fabric becomes firmer, and more compact, and in short, becomes possessed of the qualities which persons acquainted with the card-making business know to be so highly desirable, namely that of being extremely elastic in the direction of the thickness of the fabric, so as to impart as it were its elasticity to the wire-teeth when set, while in the direction of its length or warp, it is nearly non-elastic. In this state it is ready to receive the wire which is to form the cards, for which purpose we prefer using the card-making machinery, and the process being exactly the same as that now in use for making leather-cards, simply substituting the fabric or cloth above described in place of leather, it need not be described here. Though the process above described is the one which we generally prefer for carrying out our invention, we sometimes vary the process in the following manner, which may in some cases be considered preferable. Instead of the fabric, above described, composed of warp of flax, hemp, or cotton, and of woollen weft, we use in this case a fabric composed entirely of sheep's-wool, and milled to such an extent, that one yard in length, by twenty-seven inches in width, shall weigh ten or twelve ounces avoirdupois or thereabouts; this cloth is to be saturated with the caoutchouc in the manner already described, and afterwards cemented with the India-rubber varnish, or cement, to a back of strong cloth, composed like the warp in the former case, of flax, hemp, or cotton,

for which it is intended as a substitute, in order to prevent longitudinal stretching. The exposed surface of the cloth being covered with a coating of ochre and glue-size, and afterwards the whole fabric being submitted to considerable pressure from the action of rollers, or otherwise, the process is complete, and the fabric is now ready to receive the wire. Though we find the process above described perfectly adequate to the purpose of impregnating the woven fabric with caoutchouc, yet as the same is somewhat slow we generally employ certain machinery or apparatus for producing the same result in a more economical manner, which we will now describe. The nature of this machinery will be understood from the annexed drawing, and the following description, in which the same letters and figures of reference indicate similar parts of the apparatus.

Description of the Drawings.

Figs. 1 and 2, represent different views of the apparatus; and

Figs. 3 and 4, views of separate parts. A, A, are two standards, connected together by three stud rods, B, B, B, so as to form a frame, in which frame the leaves, C, and D, which are of similar form, are at liberty to move or turn on their pivots, E, E. The form of these leaves is shewn more at large in fig. 3. F, is a set screw, of which there is one in each standard, by which the leaf, D, may be set fast in the position in which it will have to sustain the pressure of the opposite leaf, C. G, G, are two levers, set fast in the pivots, E, E, of the leaf, C, and are each furnished with a weight, H, by which the leaves, C and D, are pressed together with any required force. I, I, are two triangular plates shewn by dotted lines in fig. 2; one of these is shewn more at large in fig. 4. In the back of each of these plates is riveted a thin strip of metal, J, which proceeds downwards between the two leaves, C and D, in each of which there are two slots, K, K, through which

proceed two slips of metal, *L, L*, which are connected together at their extremities, by means of two worm springs. These two springs acting on the slips of metal, *J, J*, by the intervention of two slips, *L, L*, bring the two triangular plates of metal, *I, I*, towards each other with any required force. *M*, represents a strip of the cloth rolled in a coil on a short cylinder of wood, through which a wire passes, which wire, being supported between two uprights, the whole of the strip of cloth may be drawn off at pleasure. From hence the strip proceeds over the rollers, *N* and *O*, then passing between the two leaves, *C* and *D*, and the triangular plates, *I, I*; it there receives a charge of the India-rubber varnish above described, with which the space formed by the leaves and plates, is to be kept supplied. It now passes under the roller, *P*, and on to a short cylinder of wood at *Q*, which is placed on an axis between two discs of metal, which are required to keep the strip in its place, whilst it is wound into a coil; one of these discs is made fast on the axis, and has a short pin projecting from the face of it, by which the cylinder of wood is carried round; the other disc is moveable, and is set fast upon the axis by means of a screw, so that when the coil is complete by removing this disc, the coil may be taken off, and if required, replaced in its first position at *M*, and again drawn through the India-rubber varnish. This axis at *Q*, turns between two uprights, and with its two discs is put in motion by means of a winch formed at one end of the axis. The strip having passed twice or three times through the India-rubber varnish or cement, will be found to be thoroughly penetrated with it, and is to be wound on a reel, or similar contrivance, for the purpose of allowing the solvent to evaporate. The action of the weights, *H, H*, being to force the elastic cement into the body of the cloth they must be of such a size as to give the requisite pressure, which will depend on the width or thickness of the strip of cloth under process. The cloth is now to undergo the finishing process, which

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is performed by passing it again through the machine, in a rather different manner; instead of passing it over the roller, o, it comes direct from the roller, n, to the leaf, c, along the surface of which it passes, and then between the two leaves, c and d, and from thence is wound directly on to a reel or cylinder. The space formed by the leaves and triangular pieces, being supplied with the India-rubber varnish or cement, the cloth will now receive it on one surface only, which surface must be outwards, when wound on the reel or cylinder. During this part of the process, the weights, u, n, will be required to be much smaller than in the previous part, and must be so regulated as to leave a sufficient quantity of the India-rubber varnish on the cloth, as will be sufficient to fill the pores or interstices which the process of drying has left open. When the solvent is evaporated, the other surface of the cloth is to be finished in the same way afterwards, both surfaces being covered with the coating of ochre and glue size, and the compound fabric thus produced being submitted to pressure, as before, it will be ready for the card-making machine. Though we have described this machine as applied only to the purpose of saturating narrow stripes of cloth, it may obviously be adapted to such wider widths as may be required, by simply making the machine of sufficiently large dimensions. A piece of cloth which is a proper width for sheet cards for instance, may be saturated with the caoutchouc almost with the same facility as a narrow strip, and when finished, may be cut across into sheets of the proper width, ready for the machine.

Having described the nature of our invention, and shewn how it is to be carried into effect, we would have it understood that we do not claim any of the machinery, apparatus, or means herein described, which are incident to the carrying out our invention, but we declare, that our invention consists, first, of the mode of producing a cloth or fabric, by combining sheep's wool and caoutchouc to-

gether with a third material, which third material may be either flax, hemp, or cotton, or a mixture of the same, the fabric being fullled or milled to a proper thickness, before applying the India-rubber, such fabric being peculiarly adapted to the making of wire cards; and also as a substitute for leather for other purposes.

Secondly, we claim, as our invention, the application and combination of the woollen cloth, milled or fullled to a proper thickness, and afterwards saturated with caoutchouc, and cemented on a back of strong cloth, composed of flax, hemp, or cotton, as a substitute for leather, in the making of wire cards.

And lastly, we would have it understood, that we are aware that various descriptions of fabrics have been coated with India-rubber, and have, or may have been used as a substitute for leather, and have, or may have been employed in making wire cards; we do not therefore claim the coating fabrics in general with India-rubber, but only the peculiar fabric above described.—In witness whereof, &c.

Enrolled October 3, 1839.

Specification of the Patent granted to EDWARD PEARSON TEE, of Barnsley, in the County of York, Dyer and Linen Manufacturer, for Improvements in Weaving Linen and other Fabrics.—Scaled February 11, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Edward Pearson Tee, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to a mode of unwinding the warp threads of looms (for weaving linen and other fabrics), as the fabrics are progressively formed by the weft threads, whereby the fabrics of linen, or of other fibre, will be more regularly formed, and the number of weft threads within a given space or length of fabric, will be more equal throughout the length of fabric produced, than by the means heretofore resorted to, and at the same time the warp will be kept in an equal degree of tension during the process of weaving, and in order to give the best information in my power, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

The construction of various descriptions of looms being well understood, it will not be necessary to enter at large into a description of the same, and I have only thought it necessary in the drawing to shew so much of a power loom as will enable me to explain the nature of my invention. I would however remark, that I lay no claim to the various parts of looms which are well known, and in use; nor do I confine myself to the application of my invention to the peculiar arrangement of an ordinary loom, which is shewn in the drawing; and it will not be necessary for me to show my invention as applied to various different constructions of looms, as a workman acquainted with the constructions of looms, will, from the description hereafter given, readily apply my invention to any particular arrangement of loom, to which it may be desirable to apply the same.

Fig. 1, is an end elevation of a power loom, having my invention applied thereto.

Fig. 2, is part of a front elevation, shewing the parts by which the movement of the yarn beam is effected.

Fig. 3, is also part of a front elevation, shewing the parts which produce the motion of the cloth beam to wind on the fabric, when any portion of the warp has been given

off. The same letters refer to similar parts in all the figures. *A, A, A*, is the framing of the loom. *B*, is the slay board. *C*, is a picking stick and shaft. *D*, crank-arms or connecting rods. *E*, cranks. *F*, the treadle-cam-shaft and picking-cam-shaft. *G*, is the yarn beam, and, *H*, the cloth beam. *I, I*, are the swords or supports for slay and shuttle race and boxes. *K*, the shaft on which the swords are hung. *L*, a short arm jointed to the swords, *I, I*, and also to the crank arm. *M*, is a spring on a spindle, fixed between the crank arm, *D*, and the arm, *L*, by which, and other parts working therewith, the regulation of the power of the stroke, and also the regulation of the unwinding of the warp off the yarn-beam is accomplished. *N*, is a lever connected by a pin to the frame, *A*, at, *n*, and is worked by the cam, (*a*), fixed on the crank-shaft, *E*; and by the rods, *o*, works the lever, *p*, to which is attached the catch, or driver, *h*, resting upon the ratchet-wheel, *q*, the axis of which carries the worm-wheel, *r*, which takes into the wheel, *s*, by which motion the yarn-beam, *G*, would be constantly unwinding the warp; but this is prevented by means of a slide, *c*, on the end frame, *A*, the nature of which is shewn in the drawing, which being struck at *e*, by the projection, *m*, fixed upon the swords, *i*, drives it a little forward. *d*, is a bell-crank, connected by a pin-joint to the slide, *c*, and is also attached by the chain, or cord, *f*, to an arm from the driver, *h*, (see fig. 2), so that when the slide, *c*, is driven by the forward motion of the slay-board, the driver, *h*, is raised from the ratchet-wheel, *q*, on the axis, *o*, and so moves free, leaving the ratchet-wheel stationary. The driver, *h*, is let down again by the projection, *m*, striking the slide, *c*, at *g*, in the returning motion of the slay. Hence it will be evident that wherever the point, *e*, of the slide is set at that place, the slay will be stopped by the woven cloth, because, as soon as the slide is moved, it prevents the yarn from coming from the beam, the spring, *M*, giving way to compensate; so that by setting the slide, *c*, a little nearer or further from

the slay, any proper strength of cloth, or closeness of weft may be obtained, as the power of the stroke will be increased in proportion as the reed comes earlier or later to the cloth, and is stopped thereby, and this stopping depends on the placing of the stop, *e*, and it will be seen that the nearer the stop, *e*, is to the slay, the more the spring, *m*, will be compressed.

The cloth is received by the working of the lever, *w*, on which is hung a small weight, *v*, the lever, *w*, being connected to the lever, *n*, by a chain, or cord, *s*, and by the rod, *x*, works the lever and catch, or driver, *k*, into the ratchet-wheel, *z*, which works the worm-wheel, *r*, into the wheel, *w*, fixed upon the cloth-beam, and so winds up the cloth by the falling of the weight; and thus it will be seen that the warp is at all times kept at an equal tension, and the winding on of the cloth to the cloth-beam can only take place when a quantity of warp is unwinding, and the unwinding of the warp depends on the weft having passed across, otherwise the slide, *c*, would be moved by the projection, *m*, coming against the stop, *e*, and thus throw the driver, *k*, out of action.

Having thus described the nature of my invention, I would remark that I am aware that various modes of regulating the unwinding of the warp of looms, depending more or less on the passing of the weft-threads, have been resorted to, and for some of which, patents have been obtained, I would therefore have it understood, that I do not claim the regulating by means of the weft, but what I claim is the mode of regulating the unwinding of the warp as herein described.—In witness whereof, &c.

Enrolled August 10, 1839.

Specification of the Patent granted to WILLIAM MAUGHAM, of Newport Street, Lambeth, in the County of Surrey, Chemist, for certain Improvements in the Production of Chloride of Lime, and certain other Chemical Substances.—Sealed March 22, 1836.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Maugham, do hereby declare the nature of my said invention and the manner in which the same is to be performed, are fully described and ascertained, in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

In the ordinary manufacture of the chloride of lime or soda from muriate of soda (common salt), the soda is in a great measure sacrificed in obtaining the muriatic acid, which is to supply the chlorine in that manufacture, while in the ordinary manufacture of carbonate of soda, which is also obtained from muriate of soda, the muriatic acid is lost by being permitted to escape into the atmosphere. Now my invention relates to the application in the manufacture of chloride of lime or soda, of the muriatic acid gas, evolved by the decomposition of common salt by means of sulphuric acid in the first process of the ordinary preparation of carbonate of soda, whereby sulphate of soda is produced; and my invention also relates to converting sulphuretted hydrogen gas, which is copiously evolved in certain chemical processes into sulphuric acid.

Description of the Drawing.

Fig. 1, represents a section of the apparatus. A, is a pipe communicating with the retorts or vessels in which muriatic acid, in a state of gas, is evolved, from the mixture of common salt or muriate of soda, with sulphuric acid in the first process in manufacturing carbonate of

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soda in the ordinary way. The pipe, *A*, is inserted into a cylinder of iron, or other suitable material, *B, C*, which, after being filled with black oxyde of manganese, broken into tolerably sized fragments, is closely luted down at its upper extremity, *B*. The manganese is prevented from falling below the point, *C*, by a perforated metallic diaphragm, *I*, at which point, *I*, the cylinder, *D*, is attached to the cylinder, *B, C*. The end of the cylinder, *D*, is inserted, air-tight, into the close vessel, *E, F*, in which water is placed to about the depth of an inch, which height is regulated by the bent tube, *S*; the opening at *S*, being so regulated, that any greater depth of fluid in the vessel, *E, F*, shall be discharged at *S*, the surface of the fluid being designated by the letters, *β, β*. *L, L*, is a pipe inserted in the top of the vessel, *E, F*, which at its extremity communicates with the chamber, *M, M*. This chamber, *M, M*, is traversed in its length by two or three diaphragms of platinum wire-gauze, represented by the dotted lines. Out of the chamber, *M, M*, proceed tubes, *N, N, N*, of platinum, or other suitable material (not prejudicially acted on by the operation), traversing any convenient furnace, *R, R*, whereby they are kept constantly at a red heat. The tubes, *N, N, N*, at their other extremity, all communicate with the pipe, *O, O*, whose open end is immersed about one inch in water, contained in a close vessel, *P*. From the top of the vessel, *P*, a pipe, *Q*, issues out, which communicates to the ordinary apparatus used for saturating lime or soda with chlorine. *K*, is a pipe with stop cock inserted in the cylinder, *B, C*, and its upper end communicating with any convenient reservoir of water. *G, G*, is a jacket of metal, encasing the cylinder, *B, C*, for nearly its whole length, through which, by means of the tubes, *H, H*, hot water may be made to circulate, by being introduced at the tube, *H*, at the upper end of the jacket, *G, G*, and suffered to flow out of the tube, *H*, at the lower end of the jacket, and thus maintain the cylinder, *B, C*, and its contents at any desired temperature below

that of boiling water. The apparatus thus arranged, a small stream of water is made to flow constantly over the manganese, by opening sufficiently the cock on the pipe, *κ*, the manganese being kept by means of the circulation of hot water through the jacket, *g, g*, always at a temperature of not less than 130 degrees of Fahrenheit, the object of this temperature being to prevent the formation of euchlorine gas, which is produced, during the process, at a temperature much below 130 degrees of Fahrenheit; this being premised, muriatic acid gas is suffered to enter into the cylinder, *B, c*, through the tube, *A*, which muriatic acid gas traverses the moistened and heated manganese in the cylinder, *B, c*, by which the greatest portion will be converted into chlorine. The gas, following the direction of the arrows, passes through the perforated bottom or diaphragm, *i*, into the cylinder, *D*, and bubbles up through the liquid into the upper part of the vessel, *u, r*, being conducted through the pipe, *L, L*, through the perforated diaphragms in *M, M*, and the tubes, *N, N, N*, where, if any free hydrogen gas has been generated, combustion of that gas ensues, but which combustion will be prevented from operating backwards, by the wire gauze diaphragms in *M, M*, which are placed there for safety. After passing through the tubes, *N, N, N*, the gas continues its course through the pipe, *o, o*, where the water in the vessel, *P*, will condense any muriatic acid which may have been formed by any combustion just mentioned, in the tubes, *N, N, N*, and also any which passes over without being decomposed, and thus far the chlorine is conducted by the pipe, *q*, to the apparatus in ordinary use, for saturating lime or soda with chlorine. Provision will of course be made to collect any fluid, which, in the course of the process, may flow out of the pipe, *s*, the object of which pipe is to prevent any stoppage in the process, by an accumulation of water flowing into the cylinder, *B, c*, from the pipe, *κ*, and which water will be impregnated with a portion of muriate of manganese, formed by the

solution of the manganese, by that portion of the muriatic acid gas, which, in its passage through the moistened manganese, is not converted into chlorine.

The second part of my improvement consists in the conversion of sulphuretted hydrogen gas, which is copiously evolved in certain chemical processes into sulphuric acid, and for this purpose I employ the following apparatus, reference being again had to the drawing hereunto annexed.

Figs. 2 and 3, upon the plan, represent this apparatus, fig. 2 being a front or cross section, and fig. 3, a longitudinal section thereof, and the same letters are used in figs. 2 and 3, to designate the same parts of the apparatus. A, B, C, is a closed chamber of any suitable material, in form like a muffle, and closed at both ends. This chamber is traversed by the cylinders, I, K, L, similar to each other, which are all seen in fig. 2, but only one I, L, is shewn in fig. 3, I, being hid, and K, being supposed to be removed. These cylinders are each divided internally by a series of partitions into several chambers, M, M, M, &c., and in the plan are divided into eight chambers. Out of each chamber, M, issues a jet, b, and thus in the plan each cylinder, I, K, L, having eight chambers, there will be in all twenty-four chambers and twenty-four jets. The number of chambers and jets is not material, but should be increased or diminished, according to the quantity of gas to be consumed, as hereinafter described. Into each of the chambers, M, M, &c. of the three cylinders, I, K, L, are inserted two tubes, d and g. The tubes, d, issue out out of one of the pipes, N, N, and the tubes, g, out of one of the pipes, O, O, which are placed below the vessel, A, B, C. These pipes, N, N, which are closed at the end, V, communicate at the other end with a gasometer, containing atmospheric air or oxygen gas, produced from black oxyde of manganese, and consequently are intended to convey into each chamber, M, by each tube, d, a stream of atmospheric air or oxygen gas (as the case may be);

and the pipes, o, o, which are also closed at the end, w, are connected with any vessel from which sulphuretted hydrogen gas is passing during any process in which that gas is generated. Above the jets, b, b, &c. a tube of platinum, or other suitable material, d, d, traverses the vessel, A, B, C; and all the jets, b, b, &c. are directed towards the tube, d, so that any flame issuing from the jets, b, b, &c. may play upon d, so as to envelope it by these flames, and keep it red hot. One end of the tube, d, d, is to be connected with the aperture, in the vessel, A, B, C, by means of the curved piece, d, e. The other end of d, d, is to be connected with the pipe, f, the end of which is inserted in a leaden vessel with water, g, and the cock, h, serves to draw the fluid out of the vessel. In the curved piece, d, e, is inserted in the tube, r, s, having a stop-cock, x; and the other end of r, s, is inserted in one of the pipes, n. The apparatus being thus adjusted, the sulphuretted hydrogen gas passes through the pipes, o, o, and into the several chambers, m, by means of the tubes, g, at the same time that atmospheric air or oxygen gas (as the case may be), passes through the pipes, n, n, also into the several chambers, m, by means of the tubes, d, thus forming an inflammable mixture of gases, which issue, thus mixed together, out of the several jets, b, b, &c. to which a light is to be applied, which is effected by removing the covering, t, from the opening in the vessel, A, B, C, and which is to be closed air tight, as soon as the mixture is inflamed; and the quantities of the sulphuretted hydrogen gas and atmospheric air or oxygen gas, are to be adjusted, according to the mode described for the combustion of oxygen and hydrogen gases, in my paper on a blow pipe, contained in the transactions of the Society of Arts for 1835. In the covering, t, may be inserted, a bit of mica or glass, to shew the state of the flames. The chief product of the combustion thus effected, is sulphurous acid gas, which cannot escape out of the vessel, A, B, C, except by the pipe at e, through which it is conveyed into

D, where it meets with a stream of atmospheric air or oxygen gas (as the case may be), let into D, through the pipe, R, S, and regulated by the stop cock, X, and thus mixed, the gas passes through the pipe, D, where it is kept red hot by the flames from the jets, *b, b*, &c., and thereby is converted into sulphuric acid vapour, and passing through the pipe, F, is condensed by the water contained in the vessel, G, and thus sulphuric acid is obtained. As considerable pressure is necessary to force the sulphuretted hydrogen gas through the jets, to be burned with atmospheric air or oxygen gas, it will be better to collect the sulphuretted hydrogen gas, from whatever source produced, and also the atmospheric air or oxygen gas, into gasometers or gasholders, after the manner in which coal gas is collected for use, and then to convey those products from such reservoirs, to the apparatus above described, by connecting the pipes, O, O, with the outlet pipes of such gasholders or reservoirs.

In these, my improvements, I do not claim any part of the process for obtaining carbonate of soda, nor the saturation of lime or soda with chlorine, nor the method of converting muriatic acid gas into chlorine, by passing it over moistened black oxyde of manganese; but I claim, as my invention, the exclusive use of these three operations continuously united together, namely the production of sulphate of soda from common salt, the conversion of the resulting muriatic-acid gas into chlorine, by passing it over moistened manganese, and the subsequent production of chloride of lime, when effected in an apparatus combining such an arrangement as shall permit the liquid muriate of manganese to flow away as fast as it is formed, as shall keep the moistened manganese at a degree of temperature greater than what is sufficient to explode euchlorine-gas, and as shall permit the chlorine to pass over a red hot surface as fast as it is formed. To neither of these operations singly do I lay claim, but to the whole when used in combination, and that whether

effected by the apparatus described or any modification thereof; and furthermore I claim such combination without reference to the apparatus by which the common salt shall be converted into sulphate of soda, or that by which the produced chlorine is to be converted into chloride of lime. The principal of this part of my invention being, to turn to profitable account, the muriatic-acid gas now suffered, in the manufactories of carbonate of soda from common salt, to escape into the atmosphere.

Secondly, I claim as my exclusive right, the process of converting sulphuretted hydrogen-gas, which is evolved copiously during certain chemical processes into sulphurous-acid, by mixing it previously with a sufficient dose of oxygen however procured, and burning it in a closed chamber from a series of jets. And this I claim, whether the sulphurous-acid so produced being converted into sulphuric-acid in the ordinary way, by means of nitrate of potash, or by being passed with an additional dose of oxygen through a red hot tube.

Thirdly, I claim as my exclusive right the formation of sulphuric-acid by the combustion of sulphuretted hydrogen-gas from jets set in closed vessels, from whatever source that gas may be produced.—In witness whereof, &c.

Enrolled Septembr 22, 1836.

Specification of a Patent granted to GEORGE STOCKER, of Birmingham, in the County of Warwick, Brass Founder, for Certain Improvements in Cocks or Apparatus for Drawing off Liquids.—Sealed May 13, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, 1, the said George Stocker, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and

by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon, (that is to say) :—

Description of the Drawings.

Fig. 1, shews the external form of a cock of my improved construction.

Fig. 2, represents a longitudinal section of the same. On one side of the plug, B, at A, there is a space or cavity, which being filled with cork, or other elastic material, when turned round by the key, F, to C, presses against that aperture and effectually prevents leakage. When the plug, B, is turned, as shewn in the section with the part, A, away from the opening, C, the fluid then escapes into the opening, E, and through the mouth or nose, D.

Fig. 3, represents a view of the plug. The top, at a, being the key-hole, the flat part, b, the space for the reception of an elastic material, and the aperture, c, is the passage through which the fluid flows out.

Fig. 6, represents the cork, or flexible material, having a semi-cylindrical form for the purpose of fitting the space, b, in the plug, fig. 3.

Fig. 4, represents another arrangement for applying an elastic material to prevent leakage. Part of the plug, G, being formed of a flexible substance, having a wire running through it from the upper part of the plug, and rivetted, or otherwise secured, at x. When this elastic part of the plug is lowered by means of the screw, I, or by any other convenient means, down to the nose, at D, it presses against the opening, H, and prevents the escape of fluid, but when raised, as shewn in the drawing, the liquid flows beneath it, and through the nose, A.

Fig. 5, shews another mode of applying cork, or flexible material, for the prevention of leakage. In the barrel of the cock, at J, a space is formed surrounding the hole, K; this space is filled with a soft or elastic body, which presses against the plug, and prevents the escape of the

fluid. The plug, *l*, being hollow from the line, *m*, downwards, and an opening left on one side, at *a*, when this opening is turned to the passage, *κ*, the fluid escapes through the nose, *γ*.

Having thus described the nature of my invention, I would remark, that I lay no claim to the external form of the cock, or to the materials of which cocks for drawing off liquids are made, intending to make them of any convenient form or material. But what I claim is, first, the mode or modes, as hereinbefore described, of using soft or elastic materials (such as leather, cork, cloth, India-rubber, &c.) for the more effectual prevention of leakages.

Secondly, the shapes or construction of the plugs, not confining myself as to their being conical or cylindrical, but having a form or forms as nearly approximating to the drawing as may be most convenient for the purposes hereinbefore described.—In witness whereof, &c.

Enrolled November 13, 1839.

Specification of a Patent granted to AMOS GERALD HULL, of Cockspur Street, Charing Cross, in the County of Middlesex, Esquire, for Improvements in Instruments for Supporting the Prolapsed Uterus.—
Sealed June 13, 1836.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Amos Gerald Hull, do hereby declare that the nature of the said invention and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon, (that is to say) :—

My invention of improvements in instruments for supporting the prolapsed uterus, consists of instruments to relieve and cure displacements of the womb, and on a new principle, and different from the accepted usages of the present surgical practice. The principle is that of external pressure in contradistinction to all the intervaginal means heretofore adopted. This pressure is to be effected either singly upon the hypogastric region, or conjointly upon the hypogastric and perineal regions. Experience has proved, that properly-directed pressure upon or against the lower part of the abdomen, and upon the perineal region, always relieves, and frequently removes, the displacement of the womb, and many maladies consequent thereon. The apparatus for the purpose of obtaining the proper pressure, and for which the patent has been obtained, consists of the following parts: a spring, two pads; one for the belly, the other for the back of the patient—a wedge of cork, or other suitable material, to slide between the belly-pad and the spring, and a perineal strap. The spring is an elastic-hoop of steel, clearly shewn in the drawing. The back pad is formed by a single plate of metal attached to the posterior end of the spring, cushioned, and only intended to allow this extremity of the spring to rest comfortably upon the back of the patient, and to serve for the attachment of straps to be described.

The Lower Belly or Hypogastric Pad.

This pad must be so formed as to be applied below the naval, to that part known as the hypogastric region. This pad has the form of a double inclined plain, the inner or hollow aspect of which is applied to the belly, and called the inner surface; the outer surface is the converse of the inner, and is called the back of the pad. It is necessary that the planes of the inner surface of this pad should be moveable, so that the pad can always be made to correspond exactly to the various and changing convexities of the abdomen. To effect this important object, the pad

consists of two wings of thin metal, or other suitable material, joined together near the centre of the pad by a hinge fixture. These wings, joined as aforesaid, form a pad-plate, which is covered with soft leather or cloth, and wadded or stuffed in its inner surface, so as to make a soft cushion for the belly of the patient. The belly-pad is attached to the spring by any convenient fixture by its back or outer surface at the centre. By means of the cork-wedge above named, which is slid along the under surface of the spring (upon which it is looped) till it lies upon the smaller wing of the pad, the lesser wing is depressed, and by retracting it along the spring away from the pad, the lesser wing elevates itself to contract with the spring, wherefore it is to be seen that the wedge of cork, or other suitable material, acting upon a hinge pad, accomplishes the proposed object so necessary in the case; that is, it lessens or increases the capacity or angle of the double-planed inner surface of the pad, so as to make the front or padded surface of it correspond with perfect exactness to the variable convexity of the surface of the belly. And beside, as the spring is hooped-shaped, and made to pass through the fixture upon the centre of the back of the pad, and terminates upon the back of the larger wing of the pad, and, therefore, presses harder upon that wing than it does upon the lesser wing, the wedge, being placed between the lesser wing and the spring, imparts any quantity of the force of the spring to that wing that may be required to render the pressure of the spring equal upon the two wings of the pad, by which means both sides of the hypogastric regions of the belly are equally pressed by the apparatus, a result which is very important to the cure of the difficulties to which this apparatus is intended. The apparatus is to be applied by placing the back pad upon the spine just above its junction with the hip bones, and the hypogastric pad upon the entire lower part of the front surface of the belly, the spring embracing the body closely from one pad to the

other. Furthermore, the spring is to be increased by a cushion-strap, extending from the front to the back pad, and inclosing the plate of the back pad, so as to form a cushioned-pad of it, and still continued around the opposite side of the body embraced by the spring, so as to fasten upon the front pad, and regulate its position there with greater certainty.

The Perineum Strap.

This consists of a strap of convenient size and material, elastic is preferable, which extends from the back pad under the bottom of the belly between the thighs, in order to its being attached to the front pad by holes upon corresponding knobs, so that it can be shortened or lengthened by being buttoned higher or lower upon the knobs of the front pad. This strap contains upon its inner surface a prismatic or triangular-shaped wedge (called an external pessary), also elastic, its apex looking upward, and made to correspond to the part known as the perineum, against which it is to be firmly pressed. This apparatus, completed by the addition of the perineal strap, is to be applied when there are displacements of the womb, with relaxation of the vagina and protusive or pouching of the perineum. If the vagina and perineum are not effected, the apparatus, without the perineum-strap, may be applied.

From the foregoing description, and an examination of the drawing, a workman acquainted with the making of ordinary trusses, will readily be able to carry this invention into effect, so far as the making of the instrument, and a medical man will be able to direct its application to the patient.

Having thus described the nature of the invention, and the best means I am acquainted with for combining the necessary parts of the apparatus, I do declare that I lay no claim to the separate parts thereof, nor do I confine myself to the precise arrangement, as variations may be

made, but what I do claim is the application of such combination, or the essential parts thereof, consisting of the front hypogastric pad, *a*, and the perineal wedge or cushion, *b*, to obtain external pressure to the parts above mentioned, for the supporting of the prolapsed uterus, as above described.—In witness whereof, &c.

Enrolled December 13, 1836.

Specification of a Patent granted to DAVID JOHNSTON, of Glasgow, Manchester, for Certain Improvements in the Manufacture of Hinges.—Sealed July 20, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said David Johnston, do hereby declare the nature of the said invention doth consist in forming the eyes through which the pin or rivit passes, to form a hinge, by forcing forward the metal, of which they are to be made, into dies or moulds, which, by their shape, turn the metal over into the form of eyes, as it is forced into the mould. And in further compliance with the said proviso, I, the said David Johnston, do hereby describe the manner in which the said invention is to be performed by the following statement thereof, reference being had to the drawing annexed, and to the figures and letters marked thereon, (that is to say) :—

Description of the Drawing.

Two plates of malleable or ductile metal, which, when united, are to form a hinge, are first stamped out or prepared separately in flat pieces, as shewn at fig. 5, having projections from one edge of each as tongues, corresponding with the tongues and spaces of the other as its match-plate; these tongues, when turned or bent over flatwise,

form what are called the eyes of the hinge; and when placed together, the eyes of each plate between or beside those of the other, as their number requires, with a pin or rivet through them, constitute the point of the hinge.

Now the improvement here to be described consists in the manner of bending the tongues and forming them into eyes. To do this, a die is provided of the form represented in Fig. 1, of the annexed drawing, to be made of a block of steel, or other suitable material. At *a*, is shewn a plane surface, extending back from the front side of the die at an angle of small inclination upwards, to a distance about equal to the length of the hinge-plate, and then terminating in a regular curve upwards, about equal to a semi-circle, with its concave surface towards the front of the block, as shewn at *b*. This section of a circle is to have the same line of curvature as is intended to be given to the outside surface of the eye of the hinge-plate to be formed by it. The bending of the tongues is effected by forcing them end foremost into and against the concavity of the die, by which the tongues, conforming to its curve, become bent flatwise in their whole length, or so as to bring the ends over to their own surface, or to that of the plate to which they belong, as shewn at fig. 6. For this purpose a machine is to be provided for producing a reciprocating, or go-and-come motion, of sufficient power and extent, to form the tongues, by means of a steel-follower or driver, effectually into the die, and then returning back far enough to allow the hinge-plate to be removed, and another placed before the driver ready for a like operation: this is done by any of the modes in common use for producing movements of the kind, as by a revolving-shaft, with a cam or eccentric section, or by a crank or the like, with their usual appendages, when applied to like purposes. The machine for this purpose, represented in figs. 2 and 4, is provided with a crank for producing the movement required, as shewn at *c*. *d*, is the die, firmly fixed at one end of the frame. *e*, is the

driver, between the end of which and the die the hinge-plate is placed, in order to be operated upon. *f*, is the connecting-rod between the crank and driver. *g*, is a sink in the front of the die-block, to allow for the passage of a flange or projection from the under side of the end of the driver, in order to prevent its slipping or rising over the hinge-plate, while forcing it forward, and shewn separately and more distinctly in section at fig. 7. Previous to this operation, however, a short bend is to be given to the ends of the tongues similar to that represented in fig. 3, for the purpose of facilitating its passage round the concave surface of the die: this first bending is effected by means of an apparatus connected, and operated upon, with the same machinery, and may also be called a die consisting of a lever, as shewn at *h*, fig. 2, and as shewn by the end-view of the same, at *h*, fig. 4, together with the rest, at *i*, on which the tongues are placed for the operation. On the under side of the head, or outer end of this lever, are two rectangular projections, in form of off-sets, as seen at *j* and *k*, by means of the arm upon the shaft of the operating wheel, as at *l*, in nature of a cam, an up-and-down motion is given to the back-end of the lever, at every revolution of the wheel, by means of which the head of the lever is also alternately raised and borne down, as of course. At its elevation, the ends of the tongues of the hinge-plate are placed under the lower projection, which, in its horizontal extent, is calculated just to catch upon the upper surface of the ends of the tongues, when thus placed near it, so as to carry them down with its next downward motion. This tends to elevate the outer end of the hinge-plate, as now lying upon the rest (the distance between the rest and lower projection, being about equal to the thickness of the plate), but the upper projection over-reaching the other for the purpose, comes upon the outer end of the plate, and bears it down to a level with the top of the rest, and thus produces the bend required. When the

head of the lever is again raised, the plate is taken out, prepared to be placed before the die. This operation is shewn in section, at fig. 8.

Fig. 1, is a separate view of the concave die ; and,

Fig. 9, is a sectional view of the same, with the hinge-eye in progress of manufacture. .

Now whereas I claim as the said invention forming the eyes of hinges out of one piece with the hinge-plate, by forcing that portion of the metal of which they are to be composed into dies, so shaped or formed as to turn over the metal into the form of eyes, as the metal is forced into the die or mould, as represented by the drawing annexed. And such invention being, to the best of my knowledge and belief, new, and never before used within that part of Her said Majesty's United Kingdom of Great Britain and Ireland, called England, I do hereby declare this to be my specification of the same, and that I do verily believe this, my said specification, doth comply in all respects fully, and without reserve or disguise, with the proviso in the said hereinbefore in part recited letters patent contained, wherefore I hereby claim to maintain exclusive right and privilege to the said invention.—In witness whereof, &c.

Enrolled October 20, 1839.

ALTERATIONS AND DISCLAIMERS IN SPECIFICATIONS.

In the matter of a Patent granted to WILLIAM MAUGHAM, of Newport Street, Lambeth, in the County of Surrey, Chemist, for Certain Improvements in the Production of Chloride of Lime and certain other Chemical Substances.—Sealed March 22, 1836.

Disclaimer and Memorandum of alteration, entered by the said WILLIAM MAUGHAM, with the clerk of the Patents of England, pursuant to the act.

In the said specification, inrolled in pursuance of the proviso in the said letters patent, I did declare that the invention related to a mode of employing the muriatic acid evolved in the decomposing of common salt, and also to converting sulphuretted hydrogen gas, which is copiously evolved in certain chemical processes into sulphuric acid. And I did claim four points or particulars of invention, and since the inrolment of the said specification, I have found that so much of the invention as is explained to relate to the formation of sulphuric acid, by passing a mixture of sulphurous acid and oxygen gas through a red hot tube or tubes, heated by the combustion of sulphuretted hydrogen gas, is a difficult process, and cannot be carried on with advantage, for which reason I do, therefore, wish to disclaim, and do hereby disclaim, the following words in the second claiming clause, viz., "*And this I claim whether,*" and also the words, "*or by being passed with an additional dose of oxygen through a red hot tube ;*" and in order to make sense of such second claiming clause, when those words are removed, I am desirous of altering the word "*be*" into "*being*," when the second claiming clause will be in the following words : "*Secondly, I claim as my exclusive right the process of converting sulphuretted hydrogen which is evolved copiously during certain chemical processes into sulphurous acid by mixing it previously with a sufficient dose of oxygen, however procured, and burning it in a closed chamber from a series of jets, the sulphurous acid so produced being converted into sulphuric acid in the ordinary way by means of nitrate of potash.*" And for the same reason I wish to disclaim the fourth claiming clause, and so much of the specification as relates thereto.—In witness whereof, &c.

PATENTS GRANTED FOR SCOTLAND,

(From November 23, to December 21, 1839)

THOMAS KERR, of Forecrofts Dunse, in the county of Berwick, for a new and improved mortar or cement for building, and other purposes.—Sealed November 23, 1839.

WILLIAM MILLER, of Clitheroe, in the county of Lancaster, Engineer, for certain improvements in grates used in steam-engine or other furnaces or fire places.—Sealed December 5, 1839.

JOHN SWINDELLS, of Manchester, in the county of Lancaster, Manufacturing Chemist, for certain improvements in the manufacture of Prussian blue, prussiate of potash, and prussiate of soda.—Sealed December 5, 1839.

FRANCOIS VONILLON, of Princes Street, Hanover Square, in the county of Middlesex, Silk Mercer, for improvements in the manufacture of ornamental woven fabrics. Communicated by a foreigner residing abroad.—Sealed December 6, 1839.

GEORGE LOWE, Engineer to the Chartered Gas Company, and **JOHN KIRKHAM**, Engineer to the Imperial Gas Company, both of London, for an invention of improvements in the manufacture of gas for purposes of illumination.—Sealed December 6, 1839.

JOHN JUCKES, of Shropshire, Gentleman, for an invention of improvements in furnaces and fire-places, for the better consuming of fuel.—Sealed December 12, 1839.

MOSES POOLE, of Lincoln's Inn, in the county of Middlesex, Gentleman, for improvements in looms for weaving. Communicated by a foreigner residing abroad.—Sealed December 12, 1839.

CHARLES DOD, of 21, Craven Street, Strand, in the county of Middlesex, Gentleman, for a certain improvement in the construction of railways and tram-roads, and in the carriages to be used thereon, and otherwise. Communicated by a foreigner residing abroad.—Sealed December 18, 1839.

CHARLES COWAN, of Penicuik, in the county of Edinburgh, in that part of the United Kingdom called Scotland, Paper Manufacturer, and **ADAM RAMAGE**, of Valleyfield, in the same county, Paper Maker, for improvements in machinery used in the manufacture of paper.—Sealed December 19, 1839.

WILLIAM PALMER, of Sutton Street, Clerkenwell, in the county of Middlesex, Lamp Maker, for improvements in lamps and in the manufacture of Candles.—Sealed December 21, 1839.

JOHN SUTTON, of John Street, Roupell Street, Lambeth, in the County of Surrey, Machinist, for improvements in obtaining power.—Sealed December 21, 1839.

AMBROSE BOWDEN JOHNS, of Plymouth, in the county of Devon, Artist, for an invention of improvements in colouring or painting walls, and other surfaces, and preparing materials used for that purpose.—Sealed December 21, 1839.

ANTONIO JAMES MAYER, of Ashley Crescent, in the parish of Saint Luke, in the county of Middlesex, Gentleman, for an invention of an improved machine for cutting splits for matches.—Sealed December 21, 1839.

LIST OF NEW PATENTS.

GEORGE DAVEY, of Llandudno, county of Carnarvon, Mining Agent, for an improved mode of applying water-power.—Sealed December 2, 1839.—(*Six months.*)

LUKE HEBERT, of Birmingham, Patent Agent, for improvements in the mechanism and process of packing and pressing various articles of commerce. Communicated by a foreigner residing abroad.—Sealed December 2, 1839.—(*Six months*)

MILES BERRY, of Chancery Lane, Patent Agent, for certain improvements in machinery or apparatus for making or manufacturing pins and sticking them in paper.

Communicated by a foreigner residing abroad.—Sealed December 2, 1839.—(*Six months.*)

GODFREY ANTHONY ERMEN, of Manchester, Cotton Spinner, for certain improvements in machinery or apparatus for spinning, doubling, or twisting cotton, flax, wool, silk, or other fibrous materials, part of which improvements are applicable to machinery in general.—Sealed December 2, 1839.—(*Six months.*)

JOHN EVANS, of Birmingham, Paper Maker, for improvements for chemically preparing and cleansing of felts used by paper manufacturers.—Sealed December 2, 1839.—(*Six months.*)

HENRY DUNINGTON, of Nottingham, Lace Manufacturer, for improvements in machinery employed in making frame work knit, or stocking fabrics.—Sealed December 2, 1839.—(*Six months.*)

JAMES GUEST, Junior, of Birmingham, Merchant, for improvements in locks and other fastenings.—Sealed December 2, 1839.—(*Six months.*)

GEORGE SAUNDERS, of Hooknorton, Oxford, Clerk, and JAMES WILMOT NEWBERRY, of the same place, Farmer, for improvements in machinery for dibbling or setting wheat and other grain or seed.—Sealed December 2, 1839.—(*Six months.*)

HENRY TREWHITT, of Newcastle-on-Tyne, Esquire, for certain improvements in the fabrication of china and earthenware, and in the apparatus or machinery applicable thereto. Communicated by a foreigner residing abroad.—Sealed December 4, 1839.—(*Six months.*)

CHRISTOPHER NICKLES, of York Road, Lambeth, Gentleman, for improvements in propelling carriages. Communicated by a foreigner residing abroad.—Sealed December 4, 1839.—(*Six months.*)

PIERRE NARCISSE CRONIER, of Fricourt's Hotel, Saint Martin's Lane, for improvements in filters, and in the means of cleansing the same, and for separating colouring and tanning matters for filtration, and for improvements

in employing such tanning matters by filtration. Partly communicated by a foreigner residing abroad.—Sealed December 4, 1839.—(*Six months.*)

JAMES MAYER, of Ashley Crescent, Saint Luke, Gentleman, for an improved machine for cutting splints for matches.—Sealed December 4, 1839.—(*Six months.*)

GEORGE LOWE, Engineer to the Chartered Gas Company, and JOHN KIRKHAM, Engineer to the Imperial Gas Company, both of London, for improvements in the manufacture of gas for purposes of illumination.—Sealed December 4, 1839.—(*Six months.*)

JAMES NASMYTH, of Patricroft, near Manchester, Engineer, for certain improvements applicable to railway-carriages.—Sealed December 4, 1839.—(*Six months.*)

JOHN HEATON HALL, of Doncaster, Chemist, for improvements in preserving and rendering woollen and other fabrics and leather waterproof.—Sealed December 5, 1839.—(*Six months.*)

HARROLD POTTER, of Manchester, Esquire, for certain improvements in printing calicoes, muslins, and other fabrics.—Sealed December 9, 1839.—(*Six months.*)

SAMUEL WHITE, of Charlton, Marshatts, Dorset, Esquire, for improvements in preventing persons from being drowned.—Sealed December 9, 1839.—(*Six months.*)

MOSES POOLE, of Lincoln's Inn, Gentleman, for improvements in the manufacture of caustic, soda, and carbonate of soda. Communicated by a foreigner residing abroad.—Sealed December 9, 1839.—(*Six months.*)

THOMAS RICHARDSON, of Newcastle, Chemist, for a preparation of sulphate of lead, applicable to some of the purposes for which carbonate of lead is now applied.—Sealed December 9, 1839.—(*Six months.*)

JOHN LESLIE, of Conduit Street, Hanover Square, Tailor, for improvements in measuring the human figure. Communicated by a foreigner residing abroad.—Sealed December 9, 1839.—(*Six months.*)

JOHN JUCKES, of Shropshire, Gentleman, for improve-

ments in furnaces or fire-places for the better consuming of fuel.—Sealed December 9, 1839.—(*Six months.*)

PIERRE FREDERICK GONGY, of Tavistock Street, Westminster, Watch Maker, for an improvement in clocks, watches, and other time-keepers.—Sealed December 11, 1839.—(*Six months.*)

ROBERT HERVEY, of Manchester, Drysalter, for certain improvements in the mode of preparing and purifying alum, alumina, aluminous mordants, and other aluminous combinations and solutions, and the application of such improvements to the purposes of manufacture.—Sealed December 13, 1839.—(*Six months.*)

ROBERT GILL RANSOM, of Ipswich, Paper Maker, and SAMUEL MILLBOURN, Foreman to the said R. G. Ransom, for improvements in the manufacture of paper.—Sealed December 13, 1839.—(*Six months.*)

ANGIER MARCH PERKINS, of Great Coram Street, Civil Engineer, for improvements in apparatus for transmitting heat by circulating water.—Sealed December 13, 1839.—(*Six months.*)

JACOB BRAZILL, Governor of Trinity Ground, Deptford, for improvements in obtaining motive power.—Sealed December 16, 1839.—(*Six months.*)

HENRY SEYMOUR MOORE VANDELEUR, of Kilrush, Ireland, for improvements in paving or covering roads, and other ways.—Sealed December 16, 1839.—(*Six months.*)

SAMUEL WALTON FAXON, of Park Village, East, Regent's Park, Surgeon, for an apparatus to be applied to the chimneys of gas and other burners, or lamps to improve combustion.—Sealed December 16, 1839.—(*Six months.*)

MONNIN JAPY, and CONSTANT JOUFFROY DUMERY, of George Yard, Lombard Street, Gentlemen, for improvements in rotatory engines, to be actuated by steam or water.—Sealed December 16, 1839.—(*Six months.*)

DAVID MORISON, of Wilson Street, Finsbury, Ink Ma-

ker, for improvements in printing.—Sealed December 16, 1839.—(*Six months.*)

DAVID NAYLOR, of Copley Mill, Halifax, Manufacturer, and JOHN CRIGHTON, Junior, of Manchester, Machine Maker, for certain improvements in machinery for weaving, single, double, and treble cloths, by hand or power.—Sealed December 16, 1839.—(*Six months.*)

GEORGE WILSON, of Salford, Machinist and Engineer, for certain improvements in steam-whistles^t adapted for locomotive engines and boilers, and other purposes.—Sealed December 16, 1839.—(*Six months.*)

JOHN ROBINSON, of North Shields, Engineer, for an improved steering apparatus.—Sealed December 16, 1839.—(*Six months.*)

JOHN WOOD, of Burslem, Stafford, Manufacturer of Mineral Colours, for a new method or process in the application and laying on of the substances used in the printing, colouring, tinting, and ornamenting of china, porcelain, earthenware, and other wares of the same description, by which such wares can be painted and ornamented with flowers and other devices in a much cheaper and more simple and expeditious manner than by any process now in use, and colours of all or any variety may be painted, shaded, mixed, and blended together in one of and the same design or pattern, and hardened or burnt into the substance of the aforesaid wares by a single process of firing or hardening in the enameling kiln.—Sealed December 16, 1839.—(*Two months.*)

JAMES WILLIAM THOMPSON, of Turnstile Alley, Long Acre, Upholsterer, for improvements in the construction of bedsteads, which improvements are particularly applicable to the use of invalids.—Sealed December 16, 1839.—(*Six months.*)

WILLIAM NEWMAN, of Birmingham, Brass Founder, for certain improved mechanism for roller blinds, which it is intended to denominate Simcox and Company's patent blind furniture.—Sealed December 16, 1839.—(*Six months.*)

JOSEPH GIBBS, of Kennington, Surrey, Engineer, for an improvement or improvements in the machinery for preparing fibrous substances for spinning and in the mode of spinning certain fibrous substances.—Sealed December 21, 1839.—(*Six months.*)

GEORGE LINDSAY YOUNG, of Hackney, in the county of Middlesex, Gentleman, for an improved surface for paper, mill or card board, vellum and parchment.—Sealed December 21, 1839.—(*Six months.*)

HENRY FRANCIS RICHARDSON, of Ironmonger Lane, Gentleman, for improvements in omnibuses.—Sealed December 21, 1839.—(*Six months.*)

JOHN CUTTS, of Manchester, Machine Maker, and **THOMAS SPENCER**, of the same place, Mechanic, for certain improvements in the machinery or apparatus for making wire cards for carding cotton, silk, wool, and other fibrous substances.—Sealed December 21, 1839.—(*Six months.*)

LAURENCE WOOD FLETCHER, of Chorlton-upon-Medlock, Manchester, Machinist, for an improvement or improvements in the manufacture of woollen and other cloths, or fabrics, and in the application of such cloths or fabrics to various useful purposes.—Sealed December 23, 1839.—(*Six months.*)

THOMAS FIRMSTONE, of Newcastle, Coal Master, for improvements in the manufacture of salt.—Sealed December 24, 1839.—(*Six months.*)

ALEXANDER MAC'RAE, of the London Coffee House, Ludgate Hill, London, for improvements in machinery for ploughing, harrowing and other agricultural purposes to be worked by steam or other power.—Sealed December 24, 1839.—(*Six months.*)

THOMAS HARDEMAN CLARKE, of Birmingham, Cabinet maker, for certain improved fastenings for window sashes, tables, and such like purposes.—Sealed December 24, 1839.—(*Six months.*)

THE
REPERTORY
OF
PATENT INVENTIONS.

No. LXXIV. NEW SERIES.—FEBRUARY, 1840.

Specification of the Patent granted to JOHN DICKSON, of Brook Street, Holborn, in the City of London, Engineer, for certain Improvements in Rotatory Steam-Engines.—Sealed March 6, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said John Dickson, do hereby declare that my improvements in rotative steam-engines, are described in the drawings, figs. 1 and 2, as attached to this specification.

Description of the Drawing.

A, the induction-pipe, for conveying the steam from the boiler to the box, holding the slide valve, B. C, C, C, the apertures for conveying the steam to and from the internal cylinder, as it may be required, to work the engine. D, the internal cylinder, for receiving and delivering the steam to and from the apertures. E, the eduction-pipe, for conveying the steam into the open air, or a condenser. F, F, the abutments used for the steam to act on, whilst it is propelling the piston forward, with the

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work in the steam-cylinder or ring, *u*, one of which abutments is raised to allow the piston to pass it, whilst the other is shut; the motion of the abutments as described, are continued alternately during each revolution the piston makes. *a*, eccentric for working the said abutments, by means of the two small levers, *h*, *h*, with their sundry apparatus attached thereto; the eccentric being fixed on the main shaft, *i*, it revolves with the internal cylinder and piston attached thereto. The piston, *k*, is metallic, and has a spring acting on two wedges, for the purpose of keeping the metals extended to their places in the cylinder, so as to be steam-tight; the covering plate is supposed to be taken from the piston, for the purpose of shewing the above arrangement. *l*, *l*, the plumb-blocks, for carrying the centre shaft, to which is attached the work. *m*, *m*, *m*, *m*, are soft packings, placed in cavities, which surround the internal cylinder, for the purpose of keeping the same steam-tight, beyond the range of the piston. *n*, *n*, *n*, *n*, are metal rings, placed against the soft packings, and acted on by the pins, *o*, *o*, *o*, *o*, for the purpose of tightening those packings, when required. *p*, *p*, are two boxes surrounding the said pins, *o*, *o*, and which can be taken out of their places at all times when it is found necessary to repair the soft packings, without displacing any other part of the engine. *q*, *q*, are two stuffing-boxes, surrounding the rods, *r*, *r*, for the purpose of keeping them steam-tight, when opening and shutting the said abutments. *s*, *s*, are two guides for the motion from the eccentric to the levers, *h*, *h*. *t*, rack-pinion handle and rod, for moving the slide, *b*, upon its face, for the purpose of stopping, starting, or reversing the motion of the engine, as no other working valve is required. The same letters are referred to in both views of this engine.

I hereby claim as my invention that part of the arrangement called the internal cylinder, as affixed to the main axis, and composed of two cavities, for conveying

the steam from the boiler, for the purpose of acting on the piston, and likewise for the purpose of making its escape into the open air, or to a condenser, as this engine may be worked either as a high or a low pressure engine. I also claim that part called the nozel, on the end of which is placed a three-holed slide, to be used for the purpose of starting, stopping, reversing, or entirely shutting off the connexion between the engine and boiler. This nozel has three cavities therein, corresponding with the three-holed slide: one for ingress, another egress, the third allowing the escape under the slide, either into the open air, or into a condenser. Also a box, which comes in two parts in the end of the said nozel, for the purpose of getting at the packings, which fill the cavities for the purpose of keeping the internal cylinder steam-tight. These packings may be made either of soft elastic materials, or of metals, also the steam piston, κ , as shewn in fig. 2, which is wholly composed of metal, with rounded corners, two wedges, and one spring, for the purpose of keeping the metals extended to their places in the cylinder, so as to be steam-tight. See the drawings, figs. 1 and 2.—In witness whereof, &c.

Enrolled September 6, 1839.

Specification of the Patent granted to HENRY CURZON, of the Borough of Kidderminster, in the County of Worcester, Machinist, for Improvements in Presses.
—Sealed April 16, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said Henry Curzon, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following statement thereof, reference being

had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to a certain mode of combining mechanical instruments into a press, as hereafter described.

Description of the Drawing.

The drawing shews a perspective view of a press, constructed according to my invention. *a*, is the bed of the press; and *b, b*, two uprights, or side framings of the press, which are strongly affixed to, or form part with the bed of the press. *c, c*, are two ties or braces, which combine the two side framings, *b, b*, and keep the upper part of the frame stiff. Each of the side framings, *b*, has two racks, *b*¹, formed thereon, or securely affixed thereto, as is clearly shewn in the drawing. *d*, is the platten or moving surface of the press, having bearings, *e, e*, in which the two axes, *f, f*, turn. On each of the axes, *f, f*, there is a screw-wheel, *g*, which respectively take into and are driven by the screw, *h*, which turns in suitable bearings at one side of the framing, as will readily be understood on examining the drawing; and in addition to the screw-wheels, *g, g*, the axes, *f, f*, have each two toothed pinions, *i, i*, affixed thereto, which take into the racks, *b*¹, on the uprights or side framings, *b*; consequently when the screw, *h*, is turned, the axes, *f, f*, will be turned, and by means of their pinions taking into the toothed racks, the platten will be caused to rise or fall, according to the direction in which the screw, *h*, is turned, and motion is communicated to the screw, *h*, by means of the axis, *j*, which is turned by a winch handle, *k*, there being a beveled toothed-wheel affixed in the axis, *j*, such beveled toothed-wheel taking into, and driving the wheel affixed to the upper end of the screw, *h*. By this combination or arrangement of parts, a very powerful, yet simple construction of press is obtained; and I would remark, that variations may be made in the driving

means which I have described, to the press, and yet retain the peculiar combination of the racks, *b*¹, the axes, *f*, *f*, and the pinions, *i*, *i*; for it will be evident when greater power is desired, that instead of the winch-handle, *k*, a screw wheel may be affixed on the axis, *j*, and there may be an additional axis turned by a winch-handle, in suitable bearings, with a screw on it, taking into, and driving the screw-wheel on the axis, *j*; or that the screw, *h*, may be dispensed with, and in place of the screw-wheels, *g*, *g*, to apply two cog-wheels (gearing into each other) on the shafts or axes, *f*, *f*, and either applying a crank handle to one of the axes, *f*, or, when greater power is desired, to have bearings on the platten for a third axis, on which axis is to be affixed a pinion, to take into and drive one of the cog-wheels on the axes, *f*, all which will readily be arranged by a mechanic, capable of making the other parts of the press.

Having thus described the nature of my invention, I would remark that I lay no claim to any of the parts separately; and it will be evident, that in place of having the racks, *b*¹, stationary, they may be affixed to the platten or moveable part of the press, and, in such case, the axes of the pinion, *i*, would be stationary as to their position.

But what I claim is, the mode of constructing presses, by combining the parts, *b*¹, *b*¹, *b*¹, *b*¹, *f*, *f*, and *i*, *i*, *i*, *i*, as above described.—In witness whereof, &c.

Enrolled October 16, 1839.

Specification of the Patent granted to THOMAS BONSOR CROMPTON, of Farnworth, Bolton, in the County of Lancaster, Paper Manufacturer, for Improvements in the Manufacture of Paper.—Sealed April 9, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso,

I, the said Thomas Bonsor Crompton, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates to a mode of obtaining a partial vacuum, below a portion of the moving endless wire-cloth, on which the pulp is laid in the making of paper, in order to facilitate the separation of water therefrom. In making paper by means of what are known as Fourdrinier's machines, partial vacuum has been before resorted to, for facilitating the getting away of water and pressing the pulp by means of the outer atmosphere pressing towards the vacuum below the moving endless wire-cloth employed, but in such cases very expensive air-pumps have been used for withdrawing air from below the moving endless wire-cloth; and it is well known to machinists, that owing to the change of stroke of the pistons of such air-pumps, an uniform withdrawing of air cannot be obtained: hence the pulp passing over the vacuum-chamber, receives varying degrees of pressure, which tends to make the paper of an unequal thickness. Hence it has become desirable in using a partial vacuum below the moving endless wire-cloth, that the vacuum may at all times be maintained at as uniform a degree as possible, in order that the pressure of the atmosphere may press on all parts of the paper, equally at all times, as it is progressively made. And my invention consists in combining revolving fans (similar to those which are now extensively employed as blowing-machines) with such paper machines as are known as Fourdrinier's machines, that is, where an endless moving wire-cloth is used to receive the pulp, as is well understood.

Description of the Drawing.

Fig. 1, shews a plan; and,

in the Manufacture of Paper.

Fig. 2, a side view of what may be called the vacuum box or chamber, which is placed just before the couching rollers.

Fig. 3, is a side section ; and,

Fig. 4, a plan of the description of rotatory fan, which I employ at the time.

I would observe that the shapes of the vanes may be varied, as well as the numbers of vanes, but I prefer that whatever be the number, that it should be an odd number employed. *a*, is the vacuum-box or chamber, which has two sliding ends, *b, b*, capable of being moved to and from each other, in order to their being adjusted to the width of paper which at the time is being made on the moving wire-cloth, and the upper edges of the vacuum-box or chamber, and sliding ends, are covered with leather, in order to ensure the wire-cloth being as airtight as possible. At the upper part of the vacuum-box or chamber, a series of wires (about a quarter of an inch diameter, set about half an inch apart) are affixed from end to end of the vacuum box or chamber, which are supported at intervals, as is shewn at *c, c*. At one end of the vacuum-box or chamber is a trunk or pipe, *d*, which is connected to the rotatory fan ; and *e*, is a syphon by which the water received into the box or chamber is drawn off. *f*, is the case of the revolving fan, and *g*, is the fan with five vanes. *i*, is the eduction way for the air withdrawn from below the pulp on the moving endless wire-cloth. The rotatory fan may be placed in any convenient position in respect to the machine to which it is applied, but it is desirable to avoid bends of the trunk or pipe, *d*. I generally cause the fan to revolve 1,200 times in a minute, and I usually have a water syphon to indicate the pressure, and such pressure may be varied by the speed of the fan employed.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that I lay no claim to any of the parts sepa-

rately. But what I do claim is the combining of rotatory fans with paper machines, having moving endless cloths of wire, as above described.—In witness whereof, &c.

Enrolled October 9, 1839.

Specification of the Patent granted to JOHN EVANS, of Birmingham, in the County of Warwick, Paper Manufacturer, for Improvements in the Manufacture of Paper.—Sealed February 4, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said John Evans, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to that description of machines for making paper, where a vacuum is used, in order to obtain an atmospheric pressure on the pulp, in order to express the water therefrom, and my invention relates to the application of a peculiar description of apparatus to such descriptions of machines, in order to withdraw or remove the air from below a portion of the surface of wire cloth, on which the pulp is laid; and my invention does not otherwise alter the machinery for making paper, other than applying such new apparatus in substitution of apparatus heretofore employed for a like purpose.

According to the present means resorted to for withdrawing air from below the surface on which pulp is laid, in the process of making paper by machinery, (in order to obtain an atmospheric pressure into a vacuous vessel,) it has been usual to employ expensive air pumps, consisting of accurately formed cylinders, with pistons moving

therein, which not only produce much friction in the act of being worked, but also cost much money at their first purchase, and subsequently, in order to keep them in repair.

Now the object of my invention is, to apply apparatus of a much less costly nature, and also less liable to derangement; and further, in cases of derangement, will be found less difficult of repair. In addition to which, such apparatus will work with less power, owing to the parts not being subjected to so much friction as is necessarily consequent on the use of well and tightly packed pistons working in cylinders. The nature and construction of machines for making paper being well understood, and the application of the vacuum process thereto, it will not be necessary to enter into a particular description in this my specification, but proceed to describe the drawing, which represents an apparatus constructed according to my invention.

Description of the Drawings.

The apparatus consists of three cylinders for withdrawing the air, and the drawing shews the apparatus suitably arranged for what is called a Fourdrinier machine, but the apparatus is equally applicable to other paper-making machines, wherein it is desired to withdraw air from below the wet pulp, in order to obtain a pressure of the atmosphere to the upper surface of the pulp, *a, b, c*, are three cylinders, or other suitably shaped vessels, or one vessel divided into three compartments, open at top, and proper for containing water. *d, d, d*, are three tubes or pipes, passing through the bottoms of the vessels or compartments, *a, b, c*, and communicating with the exhausting-pipe, *e*, as is clearly shewn in the drawing. *f, f, f*, are three inverted cylinders, or other suitably formed vessels, open at their lower ends; those vessels enclose the pipes, *d*, and water is placed in the compartments or vessels, *a, b, c*. The three vessels, *f*,

have rods, *g*, affixed to their upper ends, by which the vessels, *f*, receive motion from a three-throw crank, the vessels, *f*, being guided in their movement, in order to keep them vertical. On the upper ends of the pipes, *d*, are valves, *h*, which open outwards; and on the upper ends of the cylinders, *f*, there are valves, *i*, which open outwards. By this arrangement, it will be evident, that on the vessels, *f*, being raised, air will ascend up the pipes, *d*, and enter the vessels, *f*, through the valves, *h*; but in the descent of the vessels, *f*, the valves, *h*, will be closed, and the valves, *i*, will be opened, and the air in the vessels, *f*, will pass away. It will, therefore, be evident, that if the exhausting-pipe, *e*, be connected to the trough or air chamber, over which the wet pulp is passing, the air from below will be withdrawn, and be the means of producing a vacuity in like manner to the air-pumps heretofore used. *j*, partly shews the air-chamber or trough (by dotted lines), such as have before been used in Fourdrinier machines; it consists of a quadrangular trough, having a series of bars, (with spaces between them), passing across, in order to support wire cloth as closely as possible, and yet to leave space, in order to allow of the vacuum below being effective, all which is well understood, and has been in use for many years. And I would have it understood, that I lay no claim to the employment of vacuum, in the making of paper by machines; but what I claim is, the use or application of inverted vessels, such as *f*, for the purpose of withdrawing air from below the surface of the wet pulp as herein described.—In witness whereof, &c.

Enrolled August 3, 1839.

Specification of a Patent granted to CHARLES OSBORNE, of Birmingham, in the County of Warwick, Cork-Screw Manufacturer, for a certain Improvement or Improvements in the Construction of Cork-Screws.—
Sealed July 2, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Charles Osborne, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained, in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon (that is to say) :—

My improvements in the construction of cork-screws, consist in the adaptation or application of springs to the cork-screw, for the purpose of starting or drawing out the cork a short distance from the neck of the bottle, by the elastic force or leverage of such springs, when the worm of the cork-screw has been sufficiently inserted. There are many modes of adapting such springs, and many descriptions or forms of springs capable of being applied to this purpose ; all of which modifications it is not necessary for me to describe, although they may be suitably applied to act upon what I consider to be the principle of my invention or improvement. I shall, therefore, exhibit in the drawings hereto annexed, such forms and modes of adaptation, as I have found well-suited to effect the object of my invention, without confining myself to the precise arrangement or construction of the parts therein shewn.

Description of the Drawing.

Fig. 1, represents one of my improved cork-screws,

having bow-springs applied or adapted thereto for the purpose above stated.

Fig. 2, is a section of the same : and,

Fig. 3, exhibits the several parts thereof detached. *a*, is a conical ring or collar, intended to fit on to the nozzle of the bottle. *b*, is the worm-shaft or screw, to be inserted into the cork. The upper end of this shaft is affixed, by a screw, or otherwise, to the stem, *c*, which is made fast to the handle, *d*, by a screw and nut, or other fastening. A disc or cap-plate, *e*, has a hole through its centre, in which the spindle turns freely, and below this plate a tube, *f*, embracing the spindle, acts as a washer or collar. The conical collar, *a*, is connected to the cap-plate *e*, by bowed spring-pieces of steel, or other suitable material, *g, g, g, g*, firmly rivited, or otherwise fastened, at their ends to the collar, *a*, and to the plate *e*; which bowed pieces when compressed, act between the neck of the bottle and the plate, *e*, as springs.

In fig. 1, it will be seen that the improved cork-screw is represented as applied to the neck of a bottle, and the worm inserted into the cork, which is done by turning the handle or lever in the ordinary way. The introducing the worm into the cork a sufficient distance necessarily compresses the bow-springs, as shewn in this figure, and thereby brings them into a state of tension; and when the elastic force of the springs exceeds that of the friction of contact between the cork and the bottle, it will cause the cork to be drawn up a short distance, as shewn by dots in fig. 1, and thus start the cork up out of the neck of the bottle, when it can be easily drawn out in the ordinary way, without exerting the physical force necessary with a common cork-screw. The cork after it has been removed from the neck of the bottle, may be discharged from the worm or spindle by hand in the ordinary way, or by any suitable mechanical means. I sometimes apply a contrivance shewn at fig. 4. In this instance, the worm is continued higher up the spindle, than in the former

figures, and a block or piece, *h*, having a hollow screw within it, is placed so as to work upon the worm. Two side pieces or ears extend from the block, having eyes which slide upon two upright guide-rods, *i, i*. These guide-rods are fastened below to the conical collar, *a*, their upper ends being placed in holes formed in the plate *e*, through which they pass when the springs are compressed. On the cork-screw having been removed from the bottle, with the cork upon its worm, it is only necessary to turn the handle, *d*, in the reverse direction to the coil of the worm, when the block, *h*, will be caused to slide down between its guide-rods, and push the cork off the worm.

Fig. 5, shews another modification of construction and adaptation of springs to a cork-screw, for effecting the objects of my invention, in which modification a helical, or what is commonly called a spiral or coiled spring, is used, instead of the bow-springs shewn in the former figures. *a*, is the conical collar intended to fit upon the neck of the bottle. This collar is connected by two, three, or more rods, *b*, to a plate or disc, *c*, having a hole in the centre, through which the spindle turns freely. *d*, is the handle connected to the worm-spindle, or shaft, *e, e*, in any convenient manner. *f*, is a plate or disc on the spindle, which has a collar or rim working against its upper side, and between the two plates, *c*, and *f*, are placed one or more open coiled springs, *g, g*, which springs may be enclosed or covered by a box, or any ornamental casing. On the worm being introduced into the cork a sufficient distance, the force or resistance exerted between the neck of the bottle, and the plate, *f*, will cause the springs, *g*, to be compressed, which will continue as the worm is being introduced further into the cork, or until the elastic force of the springs overcome the friction of contact between the cork and the bottle, when the cork will be started, and can be easily drawn.

Having shewn different modes of adapting springs to

a cork-screw, I again repeat that I do not intend to confine myself to any particular mode of applying them, nor to any particular form of springs, as the principle of my invention, viz. that of obtaining an elastic force for drawing up, or starting the cork upwards in the neck of the bottle, by means of springs, may be variously obtained, and the application thereof to the purpose differently modified.—In witness whereof, &c.

Enrolled July 2, 1839.

Specification of the Patent granted to JOHN RUTHVEN, and MORRIS WEST RUTHVEN, of Edinburgh, Civil Engineers, for Improvements in Boilers for Generating Steam, Economizing Fuel, Propelling Vessels by Steam or other Power, and Ventilating Vessels, and which may be applied to Mines or Buildings.—Sealed March 20, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, we, the said John Ruthven and Morris West Ruthven, do hereby declare that the nature of our said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Our improvement in boilers is attained by attaching a tube or pipe of iron, copper, or other metal of an inch bore, more or less as may be required, a sufficient length or lengths of which are made into a spiral or continuous form of any figure to suit the particular situation, and of any desired diameter; these pipes are joined by screws, cones, or otherwise made steam-tight. One end of this spiral pipe is secured to, and communicates with, the in-

terior of the boiler ; the other end of the spiral is fixed to the pump for supplying the boiler with water. The spiral is placed in the flue or flues leading from the fire to the chimney, so that the heat, in passing from the fire of the furnace, may pass through the flues in which is placed the spiral-pipe. This will be better understood by referring to the accompanying drawing.

Description of the Drawing.

Fig. 1, a section, vertical and longitudinal, of a boiler-flue and spiral. A, the end of the pipe for connecting with the pump that supplies the boiler. The water is thus made to pass through the spiral before being discharged into the boiler, at B. As the spiral tubes exhibit a much larger surface, and contain a smaller body of water for the heat in the flue to act upon ; and as that, in its progress towards the chimney, is always coming in contact with a colder body of water, a greater quantity of caloric is extracted and combined with the water, while the water, being forced in an opposite direction, is always imbibing a greater degree of heat, until it issues from the spiral into the boiler, at D, partly in a state of vapour, and partly water. As the boiler has guage-cocks and steam-valves as usual, it is unnecessary to describe them, there being nothing new claimed in the boiler but the addition of the spiral-pipes, as described. For steam-vessels or locomotive-engines, the flues containing the spiral are formed by two metal pipes, one within the other, of any required diameter, but leaving a space of about one inch, more or less, between them, and joined by a ring at each end and made steam-tight. The spaces between the pipes are thus made to contain water for the supply of the boiler, being connected with it, and the spiral being connected with it, and with each other, by a pipe or pipes, as in the annexed drawing.

Fig. 2, the boiler recommended for these purposes, it will be observed is on the construction of the Cornish

boiler, which the vertical section, *B*, is intended to represent. And the section, *C*, the flue described, with the spiral inside. *D*, the pipes forming the flue. *X*, *E*, the pipes connecting the pump for supplying the water. *F*, projecting rings for fixing the divisions of the flue by screw-bolts or otherwise. *G*, *G*, connecting the spiral and flue-pipes with the boiler. *H*, blow off cock or pipe.

For economizing fuel. After the steam is discharged from the engine, it is received into pipes, made of thin copper or other metal, so placed in a case, that a current of atmospheric air may pass over the pipes, while the steam is passing through them ; the steam is thus made to give out the heat, which is then conveyed to the furnace, or for any other purpose required, while at the same time the steam is condensed, and the water may be again pumped into the boiler ; to aid or effect this object, we use fanners for conveying the cold air over a pipe in the case, and discharging it heated into the furnace, or elsewhere.

Fig. 3, will illustrate an arrangement for this purpose : *A*, the spiral pipe, for attaching to the eduction-pipe of the engine, which pipe we prefer to be made of thin copper. *B*, the case enclosing it. *C*, fanners attached to the end of the case, *B* ; and *D*, a pipe leading from them to the furnace. *E*, pipe for taking the condensed steam to *F*, a tank for receiving the water. This figure is given in section for more distinctly illustrating it. A similar result may also be effected by fig. 4. The letters of reference apply as in fig. 3. *G*, eduction steam-pipe.

For propelling vessels by steam or other power, we adopt the principle of hydrostatics, by taking the water in at or near the bows of the vessel, and discharging it on each side at near or about the surface of the water, in a horizontal direction towards the stern, and parallel with a line drawn from stem to stern of the vessel. This is done by one, two, or more pipes, of any required diameter or dimensions, communicating with the water through the

bows, or near them, or a tank may be formed inside the bows, and filled with water, by openings through the bows; the pipes, or a pipe from the tank is attached to a water-tight case, enclosing a wheel with floats, similar to a water wheel, or wheel for fanners; the arms or floats of the wheel being of any number required, and joined together by wood or metal, so as to form separate compartments or buckets, but each open at the bottom, or near to the axle, so as to admit the water which enters the case at and around the axle, and also open at the periphery, to allow the water to be discharged by centrifugal motion into the pipe or conduit, to carry and discharge it at, near, or above the surface of the water as aforesaid. One wheel, as above described, or two or more, may be used, placed either vertically or horizontally. We consider the wheel or wheels placed horizontally, as most desirable. From the water-tight case containing the wheel, the water is conveyed by a pipe, or other suitable conduit, through the side of the vessel, and discharged as stated at, near, or above the surface of the water. To back the vessel, a sluice or valve is placed in the pipe or conduit outside the vessel, so as, by turning it, to stop the water from being discharged in the direction of the stern, and discharge it towards the bows, and thus by turning the valve or sluice in both conduits, the vessel may be made to progress or retrograde at pleasure. By reversing one of the sluices or valves, the vessel will turn accordingly. This may be better understood by examining fig. 5, a vertical, and fig. 6, a horizontal section; the same letters of reference apply to both figures. The power for propelling is applied or attached to the axle of the wheel, M, M, so as to make it revolve at the required speed, to discharge the water by centrifugal force, through the pipes. A, A, A, are openings in the bows of the vessel; and B, B, a tank, formed by a water-tight partition, or bulk-head, L, L. The pipe, c, leading to the

centre of the case, D, D, containing and communicating with the interior of the wheel, E, E, at the centre. F, a pipe or conduit for conveying the water, to be discharged outside, at, near, or above the level of the water.

Fig. 6, a horizontal section of fig. 5, with the same letters of reference. G, a sluice or valve, turning on a centre at H, which allows the water to be discharged at I, towards the stern, or by turning it to N; the water is discharged at K, towards the bows of the vessel. The power required for the vessel, to be calculated from that produced by a column of water, of a given altitude, as in Barker's Mill. The velocity of the water discharged not greatly to exceed the velocity the vessel is calculated to attain; and from this, the size of the pipe or pipes may be ascertained.

For ventilating vessels we adapt fanners similar to those described, that is, having the wheel enclosed in an air-tight case, with a pipe communicating with the centre of the wheel, and another from the edge of the case; from this latter pipe any number may be taken and distributed through the vessel whenever required, in a similar manner to gas pipes, with or without stop-cocks in each berth, or where required, or through the apartments of a building, or into mines.

Having thus described the various improvements, it may be more particularly stated, what is claimed as new is; first, the improvement in boilers of the spiral pipe, and arrangements thereof for placing it in the flue or flues through which the water is passed from the pump to the boiler. .

Second, in condensing the steam by cold air, and passing the heated air to the furnace, or where required.

Third, in the mode of propelling vessels by steam or other power, from conveying water in, at, or near the bows, or otherwise, and discharging it above the surface of the water, thereby rendering paddle-wheels unneces-

sary, and superseding all machinery outside the vessel, and enabling the vessel to be navigated with equal effect in almost every position.

Fourth, in ventilating vessels, by conveying pipes through them, with or without stop-cocks, so as air may be admitted or forced by fanners, or otherwise, when and where required, and applying the same in mines or buildings, the power being applied at the axle of the fanners, either by a crank handle, pulley, or pinion.—In witness whereof, &c.

Enrolled September 20, 1839.

Specification of the Patent granted to CHARLES ANDREW CALDWELL, of Audley Square, in the County of Middlesex, Esquire, for Improvements in Furnaces for Applying Heat of Fuel.—Scaled June 6, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Charles Andrew Caldwell, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The invention relates to a mode of applying a rotatory blower or fan-wheel to furnaces, whereby more advantageous results may be obtained from fuel burned in such furnaces, and whereby that description of fuel called anthracite coal may be burned. Before I proceed to describe the peculiar character of this invention, I would remark that I am aware the requisite supply of air to furnaces, has before been forced into a closed ash-pit by

means of blowing apparatus, and patents have been taken for various means, and apparatus for performing the same, but in such cases the exit of the vapours from the flues have been permitted, yet retarded by various contrivances, one of which was by having a loaded valve, which had to be lifted by the force of the compressed air and vapours in the flues; another arrangement consisted in inverting the end of the flue in water, and in such case the vapours had to overcome the pressure of the water by passing through the same, and another mode was, the contracting the flue or flues towards the outlet, so as to retard the progress of the vapours from the fire-place of the furnace, whilst other arrangements have simply had a blast of air into the ash-pit, without any means of retarding the progress of the heated vapours; the object in most cases being to retain the heated vapours so long as they contained heat, which could be taken up by the water or other fluid, to be heated or evaporated; but none of these plans have come into general use, and I believe they have all been abandoned. Now the objects of the present invention are the same as those above mentioned, but the mode pursued for obtaining the blast of air with the requisite retardation, are more under controul of the fireman than heretofore; and the invention consists of the combination of three particulars of construction of the instruments or apparatus employed; first, a rotatory fan or blower, to force the air into a closed ash-pit.

Secondly, the placing of the fire-bars much closer together than heretofore practised with large furnaces; and,

Thirdly, a moveable damper, by which the fireman can regulate the speed of the outgoing heated vapours, and thus at all times have the means of retarding the outlet of the heated vapours, according to the varying nature of the fuel employed, and the varying result of evaporation he is required to produce; and it has been found essential to observe these three particulars in constructing furnaces where blast of air is used, in place of the natural draft of

a chimney, in order to obtain the most advantageous results from fuel; and it is supposed that for the want of having these three particulars combined together, that parties before working under somewhat similar circumstances, have failed; and I would wish it to be understood that no claim of invention is made in the present patent to either of the three particulars separately considered, nor to any two of them, the claim of invention being confined to the combined using the three particulars above stated. Having thus explained the nature of the invention, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, represents the section of the furnace, arranged according to the invention applied to a steam-boiler.

Fig. 2, is a plan of fig. 1, being partly in section.

Fig. 3, is a front view in elevation of the furnace; and,

Fig. 4, is a transverse section of the same. In each of these figures the same letters indicate similar parts. *a*, is an ordinary rotatory-blower or fan, and *b*, the air-pipe, leading therefrom into the closed ash-pit, *c*, and it will be seen that there is a sliding valve, *d*, to the air-pipe, *c*, by which the blast can be stopped when the fire-door is opened, and the valve, *d*, has at all times a tendency to close, if not held up by the bar or handle, *e*, of the fire-door, such bar or handle moving on an axis, *e*¹, on the fire-door, and enters two staples, *f*, *g*, when the door is closed; and the inner faces of those staples being inclined planes, the forcing of the handle at the lower end thereof towards the left hand, closes the fire-door close, and the same being ground to the face of the furnace, the opening into the fire will be thus closed air-tight, and in the act of forcing the handle, *e*, towards the left hand, it will come in contact with the end of the rod, *h*, moving through a guide, *i*, the rod, *h*, being connected to one arm, *j*, of the

axis, *k*; the other arm, *l*, of the axis, *k*, being connected to the sliding-valve of the air-pipe by a short connecting-rod, as is shewn in the drawing. By this arrangement it will be evident, that whenever the fire-door is opened, the slide of the air-pipe will be closed, and when the fire-door is closed, the slide of the air-pipe will be open. *m, m*, are the fire-bars, which have exceedingly small or narrow spaces between them, and I have found three-sixteenths to one-quarter of an inch, the best for consuming fuel of the various kinds generally employed, as well as anthracite-coal; but I do not confine myself to such very narrow spaces, they may be very slightly increased, without materially prejudicing the result; but I believe that every increase will be found prejudicial. *n*, is the damper in the chimney; and I would remark that small and short chimnies may be employed when this invention is used. The damper, *n*, moves on a hinge at the lower part, as is shewn; and, although it is of importance to have a moveable damper when blast is used, there should at all times be a small opening to allow of a constant discharge of the heated vapours from the furnace, when the same is at work, and not to have a valve or pressure to overcome; and further, from the variable circumstances under which such apparatus are used, it is of importance that the opening should be capable of change with facility, in order to vary the size of opening allowed for the continued passage of the heated vapours. *o*, is a rod attached by a pin-joint to the valve, *n*, the other end of the rod, *o*, being attached by a pin-joint to the arm of the axis, *q*, and that axis, *q*, has another arm, *r*, having a connecting-rod, *s*, communicating with the cranked lever, *t*; and *v*, is a rod and handle passing through a guide, *u*, there being a series of holes in the rod, by which the position of the damper may be regulated at pleasure, by a pin passing through the guide, *u*, and the rod, *v*.

Having thus described the nature of the invention, I would remark, that I do not confine myself to the precise

arrangement of the parts here shewn and described, so long as the three particulars of apparatus or instruments are combined ; and it will be evident that relative placing of the parts, and the means of connexion, will necessarily require different modification under different local circumstances.—In witness whereof, &c.

Enrolled December 6, 1839.

Specification of the Patent granted to WILLIAM HARPER, of Cowper's Court, Cornhill, in the City of London, Patent Stove Manufacturer, and THOMAS WALKER, of Birmingham, in the County of Warwick, Machinist, for Improvements in Stoves and Grates.—Sealed May 10, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, We, the said William Harper and Thomas Walker, do hereby declare the nature of our said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Our invention relates to a mode of applying a series of tubular flues to stoves and grates, whereby the heated vapours or products from the stove or grate are caused to ascend some of such tubular flues, and enter a common chamber, and to descend down others ; and further, the external surfaces of such series of tubular flues act as heating surfaces to the air in the apartment, room, church, or other building, wherein such stove or grate is employed.

Description of the Drawing.

Fig. 1, is a view in elevation of a stove or grate, constructed according to our invention.

Fig. 2, is a section of fig. 1, whereby the nature of the internal arrangement of the parts will more readily be traced.

Fig. 3, is a plan, in section of the series or cluster of tubes constituting the flues. In each of these figures the same letters of reference indicate similar parts. *a, a*, represents the lower portion of the stove or grate containing the fire-place. This lower portion consists of a quadrangular chamber, (or it may be of other convenient figure,) the front, sides, and back of which are of iron; *b*, being the fire-place, which contains the fuel, and we prefer the same to be lined with fire-brick, and we also prefer that there should be a space, *c*, between the fire-place and the metal of the outer surfaces, *a, a*, though this is not essential, but it is desirable, in order to cause the outer metal to be heated by the intervention of the heated air contained in the space, *c*, surrounding the fire-place, and if it be desired, there may be openings from the external atmosphere into the space, *c*, and a suitable pipe or pipes to convey heated air from such space, *c*, into another room or place. We would, however, here remark, that the arrangement and construction of the lower part of the stove or grate separately, forms no part of our invention. From the upper part of the stove or grate, *a, a*, ascend a series of tubes, *d, d'*, the tubes, *d*, being ascending ways, and the tubes, *d'*, being the descending ways through which the heated vapours pass to the chimney, and by this means a very extended surface is heated, and becomes the heating means of the atmospheric-air, in the room or place in which the stove or grate is placed, for it will be seen that the atmospheric-air can circulate amongst the tubes, *d, d'*, and become

heated by the external surfaces thereof. The series of tubes, *d*, *d'*, enter into a chamber, *c*, consequently the vapours in passing from the fire-place, all ascend through the tubes, *d*, into the chamber, *c*; and from that chamber, *c*, such heated vapours pass down the tube, *d'*, and enter the flue, *f*, which may pass away at a point below the stove or grate, or at an intermediate point, as is indicated by the dotted lines, or even higher up. We would remark that the number of the tubes, *d*, *d'*, may be varied according to their size, and the extent of heating apparatus desired to be obtained. *g*, is a door or frame, in front of the fire-place, which is glazed with talc, and *h*, is a small door to remove the ashes; the doors, *g* and *h*, should fit as closely as possible, to admit little air. *i*, *i*, are airways, by which the supply of air to support combustion may be regulated; and it should be stated, that when the stove is a close stove or grate, as above described, all parts should be as air-tight as possible, to prevent air entering to support combustion, excepting at the openings, *i'*, *i'*. The fuel is supplied to the fire-place, through the tube or way, *j*, which has a cover, *k*, fitting into a circular groove or recess, filled with sand; but whatever be the supply of fuel, the ignition will not ascend into the tube, *j*, if the same be kept air-tight, and the fuel we prefer to burn is anthracite, or stone-coal, or coke of bituminous coal.

Having thus described our invention, we would have it understood, what we claim as our invention is, the mode herein described of applying a series of tubular flues and chamber, *c*, to stoves or grates.—In witness whereof, &c.

Enrolled November 9, 1839.

Specification of the Patent granted to EDWARD FRANCOIS JOSEPH DUCLOS, of Clyne Wood Works, Swansea, Gentleman, for Improvements in the Manufacture of Sulphur, Sulphuric Acid, and Sulphate of Soda.—
Sealed July 11, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Edward Francois Joseph Duclos,* do hereby declare the nature of my invention and the manner in which the same is to be performed are fully described and ascertained in and by the following statement thereof, (that is to say) :—

My invention relates, first to certain modes of manufacturing sulphur,

Secondly, to a mode of manufacturing sulphuric-acid,

And thirdly, to a mode of manufacturing sulphate of soda; and in order to give the best information in my power, I will proceed to describe the processes, as pursued by me.

The first part of my invention relates to a mode of treating pyrites, in order to obtain sulphur therefrom, and having described the process of obtaining sulphur, which constitutes one mode of obtaining sulphur, I will, for the convenience of description, proceed with the treatment of part of the products of such first process, in order to obtain sulphuric-acid according to the second part of my invention. I will then describe the other mode of manufacturing sulphur, included under the first part of my invention, and I will then describe the mode of manufacturing sulphate of soda, constituting the third part of my invention.

In treating pyrites according to the first part of my invention, a portion of the sulphur is distilled therefrom, by placing pyrites into retorts, such as I have described in my former patent for treating copper ores in order to ob-

tain a portion of sulphur therefrom, such retorts consisting of fire-clay, which are capable of being closed air-tight, at both ends, when the pyrites are under the process of distillation by heat externally applied to the retorts, there being a tube or eduction-pipe leading from each retort, and dipping into a trough or other vessel containing water by which means the vapours of sulphur distilled off and produced from the pyrites will be condensed and received into the trough or other vessel placed for such purpose, the quantity of sulphur so distilled over, being generally about 14 per cent. The pyrites in the retorts are then submitted to the process of roasting or calcining, either in such retorts, by admitting atmospheric air, or the pyrites being removed from the retorts, are to be treated in reverberatory furnaces, according to the more general mode of making copperas, until this product from the retorts is converted into proto-sulphate of iron, which is to be converted, by a further process of roasting, into a persulphate of iron, completely deprived of the water of crystallization, and is again to be treated by a further process of distillation at a high temperature; and I perform this process of distillation in fire-clay retorts, carefully excluding the atmospheric air, and by such process of distillation I obtain highly concentrated sulphuric-acid, which is condensed in any suitable vessel or receiver.

I will now proceed to describe the second mode of manufacturing sulphur, which consists of bringing sulphurous-acid gas, and sulphuretted-hydrogen gas together, and by such means obtain sulphur. I would remark, that there are many processes in manufactures where sulphurous-acid gas is evolved, such as calcined or roasting copper-ores, and such is the case in pursuing like processes on other ores; and there are many processes where sulphuretted-hydrogen gas is evolved, as is well understood, and in many processes such gases are evolved into the atmosphere, and lost, particularly the sulphurous-acid gas; and the object of my invention is to carry on suitable processes for

evolving these gases, in order to take advantage of the gases so evolved, and although I make no claim to any such processes separately, where such gases are evolved, I shall give such a description of two processes of manufacture as will fully explain the nature and object of this part of the invention, which as before stated, consists in bringing these gases together, in whatever processes they are separately evolved, and by their mutual decomposition, produce sulphur therefrom. Thus I will suppose that I am calcining copper or zinc, or other ores, containing sulphur, and I prefer that the process of calcination should be in retorts, as the products of combustion of the fuel employed, are thereby separated from the products evolved from the ores, and it is well known that in such process of calcination, much sulphurous acid gas is evolved, and I cause such gases to be conveyed by suitable pipes from the retorts, into a vessel, such as is employed in the manufacture of sulphuric-acid, and at the same time a quantity of sulphuretted-hydrogen is also admitted, and jets of steam, the bottom of the vessel or chamber being covered with water; by this means sulphur will be thrown down, and the proportions of the respective gases, which should be admitted as nearly as possible most beneficially to carry on this process, are two volumes of sulphuretted hydrogen, to one volume of sulphurous-acid gas. And the mode by which I obtain sulphuretted-hydrogen is, by treating metallic sulphurets, with muriatic-acid; and I perform this operation in wooden vessels, lined with lead, having steam-pipes of lead at the bottom, to heat the metallic-sulphurets, and I pour in muriatic-acid, by which sulphuretted hydrogen is evolved, and the metallic-sulphurets will be converted into chlorides, and the same are removed, and fresh sulphurets supplied; but I would have it understood, as before stated, that such process forms no part of the invention, as claimed under this patent, nor do I confine myself thereto, and I have only mentioned these modes of

obtaining the required gases, as one means of carrying out my invention, which relates to the so treating such gases, as by their mutual decomposition to produce sulphur, from whatever source produced.

The above modes being applicable to those cases of manufacture where metallic ores require calcining and smelting; and there is another manufacture amongst others, to which the part of my invention is particularly applicable, that is in the manufacture of carbonate of soda or potash, in which manufacture it is well known that much sulphur is thrown into the atmosphere, and much of the sulphur is taken by the lime and thrown away as refuse. The process I employ for evolving sulphuretted hydrogen is to cause carbonic-acid to pass through a concentrated solution of sulphuret of soda or potash, which I put into any suitable vessel and force streams of carbonic-acid gas through the same, by which bicarbonate of soda will be made and sulphuretted hydrogen evolved, which being brought in contact with sulphurous-acid gas, produced in any way, will be the means of obtaining the sulphur evolved in the form of those gases from the different processes, and this process I prefer to accomplish by using the apparatus generally known as *Wooff's* apparatus. And again, I would remark, that I lay no claim to the process of evolving sulphuretted hydrogen or making bicarbonate of soda by such means; and in such cases where the products of calcining copper and other ores are washed with water, the water may be first used to wash the vapours of processes producing sulphuretted hydrogen, and thus by saturating the water with sulphuretted hydrogen, such water being used to condense and wash the vapours of calcining copper and other ores, will be the means of depositing the sulphur respectively contained in the gases.

I will now describe the third part of my invention, which relates to the decomposition of common salt, by means of sulphate of protoxide of iron (copperas). And I

perform this part of the invention, by mixing these two salts in a pulverized state according to their equivalents, and submit these mixed salts to a heat of about 80 degrees to 100 degrees of Fahrenheit, for three or four days, and then submit such materials to a red heat in a reverberatory furnace, by which I obtain hydrochloric acid, peroxide of iron, and sulphate of soda. The two latter are separated by solution, the first is evolved.

Having thus described the nature of my invention, I would have it understood, that what I claim, is, first, the mode of manufacturing sulphur from pyrites as above described.

Secondly, the mode of manufacturing sulphur by bringing sulphurous-acid gas, and sulphuretted hydrogen gas together, by their mutual decomposition producing sulphur.

Thirdly, I claim the mode of manufacturing sulphuric-acid, as above described.

And, fourthly, I claim the mode of manufacturing sulphate of soda, as above described.—In witness whereof, &c.

Enrolled January 11, 1840.

Specification of a Patent granted to WILLIAM BATES, of Leicester, Fuller and Dresser, for Improvements in the Process of Finishing Hosiery and other Looped Fabrics.—Sealed June 4, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, said William Bates, do hereby declare that the nature of my said invention; and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, (that is to say):—

My invention relates to certain modes of finishing

siery and other looped fabrics, known by the names of lambs' wool, worsted, angola, and cotton, by the means hereinafter mentioned and explained. According to the ordinary process pursued previous to my former patent, Angola and cotton goods were finished by being submitted to a process of ironing by hand; lambs' wool goods were not usually either ironed or pressed, but if occasionally they were pressed, it was without having legs or shapes put into them; worsted goods were usually pressed, but not upon legs or shapes, and rough or undressed goods were generally merely put upon legs, and exposed to heat by means of a stove, to give them size and shape. And in my former patent, I did describe a certain mode of finishing goods, made of elastic stocking fabric, and known by the name of lamb's-wool, worsted, and angola, by placing within them legs or other shapes, according to the nature of the articles to be operated on, and in that state submitting the fabric to the hot pressure of any suitable surfaces produced by the heat of fluids; and I have since discovered, that pressure under such circumstances, that is, having shapes or forms inserted into the articles to be pressed, is beneficial, even though the surfaces are not heated; and one part of my present invention relates to the pressing such angola, cotton, worsted, and lambs'-wool, knit or looped fabrics, with suitable shapes or forms within them, and whether rough or dressed, by the aid of flat or other pressing surfaces, worked by screws or other presses. And in performing this part of my invention, supposing the articles to be finished, according to this part of my invention, to be stockings, each stocking has a thin flat leg or shape of wood, or other suitable material, inserted into such stocking; in this state they are to be submitted to pressure in a similar manner to that described in my former patent, but the operation takes longer time; that is, from ten to fifteen minutes, or more, and in case rollers be used as the press, then it is desirable to pass the articles through several times, or by a

very slow movement ; at the same time, I would remark, that I do not consider rollers so good a description of press as the various kinds of presses having flat surfaces. I have mentioned stockings as the articles to be treated or finished, I would, however, remark, that the same description applies to other articles, and the only difference is the flat shapes or forms of wood, or other suitable material, put into the article to be treated or finished, according to this part of my invention ; by this mode of working, I dispense with the application of heat. Another part of my invention relates to the application of heated shapes, legs, or forms, in the finishing of stockings, or other knit or looped goods of lambs'-wool, worsted, angola, or cotton, and subjecting such stockings or other knit or looped goods of lambs'-wool, worsted, angola, or cotton, to pressure, whilst they are inserted on such heated shapes, legs, or forms, and the same is performed by heating the flat legs, or other forms or shapes, before inserting them into the stockings, or other articles, to be finished by this process ; and such heating may be performed in any suitable manner. I have found that any degree of heat which will not burn or coekle the article under operation, quickens and improves the process of pressure when using legs, forms, or shapes, within the articles operated on ; and the best means I am acquainted with for heating the legs, shapes, or forms, consists of an oven, or such like vessel, heated by means of steam of 15 to 20 lbs. on the square inch, though other apparatus or means may be resorted to, My invention not relating to the modes of heating the legs, forms, or shapes, inserted into the knit or looped articles of lambs'-wool, worsted, angola, or cotton ; but to the application of such heated shapes, legs, or forms in the finishing of such descriptions of goods, and having inserted such heated legs, forms, or shapes, into the goods to be pressed, I place them between two surfaces of a press ; and I prefer placing them in single layers, using by preference flat-surfaced presses ; and where more than

one layer is placed in a press at one time, it is desirable to place between each layer a smooth sheet of mill-board, or other suitable material, in order to keep the layers separate; and in case no such mill-board or other suitable material be placed between the layers, then it is desirable to have the goods placed on the legs, forms, or shapes, with the outside towards the legs, forms, or shapes, particularly where great pressure is required; and by this means, and submitting the goods to pressure, as above described, for three to ten minutes, according to the extent of finish desired, a very beneficial operation of finishing will be obtained.

Another part of my invention relates to other means of applying heat in the process of finishing knit or looped fabrics of lambs'-wool, worsted, angola, and cotton, when the articles are placed on legs, forms, or shapes, and consists of employing heated surfaces, produced by the heat of fire or flame, or by heating surfaces with fluids, without such fluid being in contact therewith, or contained therein, and in place of employing heated surfaces containing hot fluids, as was the case in my former patent; and in order to give the best information in my power as to this part of my invention, I will proceed to describe the means pursued by me, and which I believe will be found, in practice, the best for performing this part of my invention. And I would first remark that the legs, shapes, or forms inserted into the goods may be heated or not, when performing this part of my invention, and I prefer that in place of heating the surfaces of the press itself, to employ flat plates of copper or iron, or other suitable material; and in case of iron, I put sheets of mill-board between the goods and iron plates, which being heated, are to have a layer of the goods with legs, shapes, or forms inserted therein, as above explained; and I prefer having the goods, in single layers, placed between two such plates, and then the plates and the goods between them placed in any suitable press, preferring those with flat

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surfaces, and thus submitted to pressure from three to five minutes; and it should be stated that in heating such plates, care is to be observed not to heat them to such an extent as to burn or cockle, or otherwise injure the fabrics. And I usually employ iron ovens heated by the direct action of fire, or the same may be heated with steam or other fluid. In case it be preferred to heat the surfaces of the press itself, this may be done by having suitable openings in such surfaces to receive burning charcoal, or hot irons, or gas, which being previously heated, are to be placed in the hollow surfaces of the press. And in case rollers be used as the pressing means, then the same should be formed with suitable hollow axes to receive heated iron or gas, thereby to heat the pressing surfaces of the rollers; but I would remark in respect to this part of my invention, that I prefer to use plates separately heated by any convenient means, and to place between each two of them a layer of the articles, having legs, shapes, or forms inserted therein, and submitting them in that state to the action of any suitable press or pressure; and I prefer placing mill-boards between the articles and the plates.

The object of the present invention being the employment of suitable heated surfaces, heated by any other means than hollow surfaces, heated by steam, hot water, or other fluids, when such employment of heated surfaces is combined with the employment of legs, shapes, or forms, inserted in the articles undergoing the finishing process. It should be remarked, that in treating or finishing knit or looped angola goods to hot pressure, it is desirable that they should be placed on legs, shapes, or forms, in a damp state.

Another part of my invention relates to submitting knit or looped fabrics of lambs'-wool, worsted, angola, and cotton, when on legs, shapes, or forms, to the action of steam, whereby the character and appearance of such goods will be improved; and in order to perform this part of my invention, having placed a number of stockings on legs, or drawers, shirts, waistcoats, gloves, or

other articles, on proper shapes or forms, I place them in a suitable chamber, which will contain steam, and I either suspend them in such chamber, or have a series of open shelves, on which the articles are laid, and I prefer placing them in single layers, and in this state allow them to remain in what may be called a steam-bath, for about three minutes, and then immediately press them, whilst they are hot and damp from the action of the steam, or I permit them to dry on the legs, shapes, or forms, and in some cases, without pressing them at all. The steam I use is five pounds pressure on the square inch, the chamber or bath, being provided with an outlet to run off the condensed steam. The steam-chamber I prefer to be quadrangular, sufficiently strong to resist the pressure employed, and having a door or opening ready removed in order readily to place in and remove the goods, and yet sufficiently steam tight to waste but little steam.

Having thus described the nature of my invention, I would have it understood, that what I claim is,*first, the mode of finishing knit or looped fabrics of lambs'-wool, worsted, Angola, and cotton, when on shapes or forms by means of pressure, without heat, as herein described.

Secondly, I claim the mode of finishing knit or looped fabrics of lambs'-wool, worsted, Angola, and cotton, by means of pressure when on heated shapes, as above described.

Thirdly, I claim the mode of employing heated surfaces in combination with the employment of legs, shapes, or forms, when such heat is obtained to the surfaces by any other means than by steam, hot water, or other fluids, circulating in the hot pressing surfaces, as above described.

And, fourthly, I claim the mode of treating knit or looped fabrics of lambs'-wool, worsted, Angola, and cotton, when on legs, shapes, or forms, by means of a steam-bath,

and either with or without pressure, as above described,—
In witness whereof, &c.

Enrolled December 4, 1839.

*Specification of the Patent granted to WILLIAM VICKERS,
of Firs Hill, in the County of York, Steel Manu-
facturer, for an Improvement in the Manufacture
of Cast-Steel.—Sealed June 25, 1839.*

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso,
I, the said William Vickers, do hereby declare the nature
of the said invention, to consist in the manufacture of cast
steel at one process, out of borings or turnings of wrought
iron, (a cheap and refuse material not heretofore used for
that purpose,) or out of small wrought-iron scraps, such
as old horse-shoe nails, broken bits of wire, and the like,
by the introduction of oxide of manganese and carbon.
And in further compliance with the said proviso, I, the
said William Vickers, do hereby describe the manner in
which the said invention is to be performed, by the follow-
ing statement thereof (that is to say):—

In order to make cast-steel on the said improved plan,
the ordinary furnaces and crucibles, heats and moulds,
may be used, (I prefer, however, a slightly increased tem-
perature,) but instead of melting in these crucibles,
broken pieces of bar-steel, commonly called blister-steel,
as heretofore, from which to make the cast-steel ingot, I
melt the following ingredients together in the following
proportions, that is to say: 1st, of ordinary wrought-iron
turnings or borings, or scraps, 100 lbs; 2nd, of black
oxide of manganese, two pounds; 3rd, of best ground
charcoal, three pounds. Or instead of the ground char-
coal, cast-iron turnings, or borings, or other small par-
ticles of cast-iron may be used, in which case the follow-

ing will be the proper proportions, that is to say: 1st, of ordinary wrought-iron borings, or turnings, or scraps, 100 lbs.; 2nd, of black oxide of manganese, two pounds, three ounces; 3rd, of cast-iron turnings, or borings, or other such very small particles of cast-iron, twenty-eight pounds.

Now, whereas, it is evident that the foregoing proportions may be, in both cases, susceptible of some slight variation, dependent on the quality of the ingredients used; and it is only necessary further to observe, that if turnings are used, they should be pounded into small pieces before they are put into the crucible. But I claim as the invention aforesaid, the manufacturing of cast-steel at one process from borings of wrought-iron, or from turnings of wrought-iron, or from wrought-iron small scraps melted up with oxide of manganese, and also with carbon or with cast-iron turnings or borings, or other such very small particles of cast-iron, instead of the charcoal as hereinbefore mentioned. And such invention being to the best of my knowledge and belief entirely new, and never before used, within that part of her said Majesty's United Kingdom of Great Britain and Ireland, called England; Her said dominion of Wales and town of Berwick-upon-Tweed, nor in any of Her said Majesty's colonies and plantations abroad; I do hereby declare this to be my specification of the same; and that I do verily believe this, my said specification, doth comply in all respects fully and without reserve or disguise with the proviso, in the said hereinbefore in part recited letters patent contained; wherefore I do hereby claim to maintain exclusive right and privilege to the said invention.—In witness whereof, &c.

Enrolled December 25, 1839.

LAW REPORTS OF PATENT CASES.

In the Vice-Chancellor's Court.

PROTHEROE v. MAY.

[We call the particular attention of our readers to the accompanying Law Report of *Protheroe v. May*, which is one of the most important decisions in patent law, which has taken place for many years; indeed, it is the first judgment of a court of law, which has been given on the clause contained in the letters patent which restricts the sale of a patent for an invention to more than twelve persons. Before this judgment it was the opinion of some of our best lawyers, that it was possible that a court of law would consider some classes of licences a direct interest in the patent, and that the person or persons holding such licences, would each be counted as one of the twelve; the description of licences we refer to are those which are exclusive in their nature, such, for instance, as give to the holders exclusive licence to use particular parts of a patent, or to use the whole invention in particular districts, towns, parishes, or counties. All these descriptions of licences give to the holder an interest in the patent, of a peculiar nature, and very different to what an ordinary licence gives; and it was imagined that the exclusive character of such licences would invalidate a patent, if the number of parties interested in them, together with the patentee, exceeded the number of twelve. Thus it is within our knowledge, amongst many other cases, that a patentee was desirous of granting an exclusive licence to a public company, to carry out a particular invention in London and some miles round, the patentee being at liberty to grant any other licences beyond the boundary line; but after many consultations, so strongly did the opinion prevail, that it was possible that the judges in Westminster Hall might say, that such a licence was only

another mode of dividing the property of the patent amongst more than twelve persons, that the parties were advised they had better go to parliament to obtain an act, to allow of the patent being held by more than twelve persons; and such has been the case, in respect to many other patents, within the last few years, there having been several acts of parliament passed, to allow of more persons than twelve to be jointly interested in holding a patent. By the present judgment it will be found, that a licence *is no part of the patent*, whether of an exclusive or simple nature, and that any number of persons may hold exclusive licences under a patent, and that patent be valid.]

IN this case a bill was filed by the plaintiff, for the specific performance of an agreement to grant an exclusive licence under a patent; and a question was raised as to the validity of the patent, in consequence of certain exclusive licences which had been granted by the assignees of the patent, and in order to settle this question of law, His Honour directed a case to be made, for the opinion of the judges of Her Majesty's Court of Exchequer, as follows.

The case sets out that, on the 24th of August, 1838, letters patent were duly granted, under the great seal of Great Britain, by Her Majesty, bearing date the 24th of August, 1838, to Arthur Dunn, thereby enabling him to use and manufacture a certain new and useful invention which he had discovered, of "Certain improvements in the manufacture of soap," and which letters patent as usual, contained the following clause: "*Provided likewise, nevertheless, and these our letters patent, are upon the express condition, that if at any time hereafter these our letters patent, or the liberties and privileges hereby by us granted, shall become vested in or in trust for more than the number of twelve persons, or their representatives, at any one time as partners, dividing or entitled to, divide the benefit or profits obtained, by reason of these our*

letters patent (reckoning executors or administrators, as and for the single person whom they represent, as to such interest as they are or shall be entitled to, in right of such their testator or intestate), that then these our letters patent, and all liberties and advantages whatsoever hereby granted, shall utterly cease, determine, and become void, any thing hereinbefore contained to the contrary thereof in any wise notwithstanding." "Provided that nothing herein contained shall prevent the granting of licences in such manner, and for such consideration as they may by law be granted."

A proper and sufficient specification of the said patent invention, was duly inrolled in the High Court of Chancery, within the time limited by the said letters patent for that purpose.

Before the month of July, 1839, and at the time of granting the licence next aftermentioned, the said letters patent, and the liberties and privileges thereby granted, became and were vested in twelve several persons as partners, dividing, or entitled in their own rights respectively, and not by representation, to divide the benefit or profits obtained by reason of the said letters patent.

On the first day of July, 1839, the said twelve patentees, or persons in whom the said letters patent were so vested as aforesaid, signed and executed an instrument in writing, whereby, after reciting that they had agreed with Samuel Guppy and Philip Protheroe, to grant unto them an exclusive licence, for the use and exercise of the said invention within the city of Bristol, and at such other place or places within thirty-five miles therefrom, as described on the map with a compass, having Bristol for its centre, as they should think proper, and in consideration thereof, the said Samuel Guppy and Philip Protheroe, have agreed to be bound by such terms, restrictions, stipulations, and agreements, as hereinafter mentioned and expressed; it was by the said licence witnessed, that in pursuance of the said agreement and in-

consideration of the covenants, provisos, and agreements thereafter contained; they the said twelve patentees or persons in whom the said letters patent, and the liberties and privileges thereof, were so vested as aforesaid, did give and grant unto the said Samuel Guppy and Philip Protheroe, and the survivor of them, during the remainder of the term of fourteen years mentioned in the said letters patent, and for which the said letters patent were granted, the full and free liberty, sole and exclusive licence and authority to and for them, the said Samuel Guppy and Philip Protheroe, and the survivor of them, for their and his own use and benefit, subject to the provisos and stipulations thereafter contained, to use the said discovery or invention within the city of Bristol, and at such other place or places within thirty-five miles from the said city as aforesaid, as they the said Samuel Guppy and Philip Protheroe, or the survivor of them, should think proper; and in consideration of the licence and authority therein-before given and granted, they, the said Samuel Guppy and Philip Protheroe, did for themselves jointly, and each of them did for himself separately, covenant with the said twelve patentees, or persons in whom the said letters patent were vested, their executors, administrators, and assigns, that they the said Samuel Guppy and Philip Protheroe, and the survivor of them, should and would, during the term for which the said letters patent had been granted, continue to manufacture, by means of the said patent process, and according the said specification, weekly, and every week, — tons of soap, at the least, and such further quantity, not exceeding — tons per week, as they the said Samuel Guppy and Philip Protheroe, or the survivor of them, should think fit; and that they the said Samuel Guppy and Philip Protheroe, and the survivor of them, should not in any one week exceed the said quantity of tons, without the consent in writing of the said twelve patentees, or persons, in whom the said

letters patents were vested, their executors, administrators, or assigns. And also, that they the said Samuel Guppy and Philip Protheroe, or the survivor of them, his executors and administrators, should and would well and truly pay, or cause to be paid, unto the said twelve patentees, or persons in whom the said letters patent were vested, the sum of —*l.* of lawful English money, for every ton of soap, which they the said Samuel Guppy and Philip Protheroe, or the survivor of them, should from time to time manufacture by means of the said patent process, during the term for which the said licence was thereby granted, and should and would make such payments on the first day of every month ; the first of such payments to be made on the first day of August then next, and should and would for the first year of the said term, pay unto the said twelve patentees or persons, in whom the said letters patent were vested their executors, administrators, or assigns, the sum of —*l.* per week, whether or not so much as — tons of soap weekly should have been manufactured by the said Samuel Guppy and Philip Protheroe, or the survivor of them, under and by virtue of the said licence thereby granted. And further, that they, the said Samuel Guppy and Philip Protheroe, and the survivor of them, should and would at or before the respective times appointed for such payments as aforesaid, deliver, or cause to be delivered, unto the said twelve patentees, or persons in whom the said letters patent were vested, their executors, administrators, or assigns, or unto some person or persons duly authorized by them, in writing, under their hands, to receive the same on their behalf, a just and true account, in writing, of all the soap which should have been manufactured by them, the said Samuel Guppy and Philip Protheroe, or the survivor of them, for the month next preceding the rendering of every such account, together with true copies of all returns made and rendered to the

excise for the like period, and should and would verify any and every such account and copy respectively, by affidavit or suitable declaration, if required. And further, that in case they the said Samuel Guppy and Philip Protheroe, or the survivor of them, should at any time or times refuse or neglect to deliver or cause to be delivered such a just and true account as hereinbefore mentioned, at the times and in the manner thereinbefore appointed for that purpose, or should wilfully or knowingly mis-state or omit any such account, then and in every such case, and so often as the same should happen, (subject to all other rights and remedies for breach of the said covenant or otherwise,) the said Samuel Guppy and Philip Protheroe, or the survivor of them, his executors or administrators, should and would, on demand, well and truly pay or cause to be paid unto the said twelve patentees or persons in whom the said letters patent were vested, their executors, administrators, or assigns, in addition to the monies which would otherwise become payable to them, under and by virtue of these presents, the sum of ———/l. as and for liquidated damages. Provided always, and it was hereby declared and agreed by and between the said parties thereto, that it should be lawful for the said Samuel Guppy and Philip Protheroe, and the survivor of them, at any time after the expiration of one year from the date thereof, to relinquish and give up the licence thereby granted, on giving to the said twelve patentees as aforesaid, their executors, administrators, or assigns, three calendar months' previous notice in writing thereof, and that upon and after the expiration of such notice, the said licence should cease, determine, and be utterly void, to all intents and purposes whatsoever, but without prejudice, and except as aforesaid. And the said Samuel Guppy and Philip Protheroe, for themselves jointly, and each of them separately, did further covenant with the said twelve patentees, or persons in whom the said letters patent were

vested, their executors, administrators, and assigns, that they the said Samuel Guppy and Philip Protheroe, or the survivor of them, should not at any time or times thereafter, wilfully or knowingly do, or cause, or permit, or suffer to be done, or wilfully or knowingly concur in or do any act, deed, matter, or thing whatsoever, contrary to the restrictions and provisions contained in the said letters patent, or in the said licence, or whereby, or by reason whereof, the validity or continuance of the said letters patent, or the rights and privileges thereby granted, or any of them, could or might in any respect be endangered or called in question, but should and would by every lawful means in their power, assist the said twelve patentees or persons in whom the said letters patent were vested, their executors, administrators, and assigns, at their expense, and to be done under their direction, in supporting the same, and in the use and exercise of the said invention; and also give notice to them of any infringement of the said letters patent by any person or persons whomsoever, within the knowledge of the said Samuel Guppy and Philip Protheroe, or the survivor of them, as soon as the same should come to their or either of their knowledge; and should and would keep and preserve regular account books, and therein daily cause just and true entries to be made of all soap manufactured by them or either of them, from time to time as aforesaid, and permit and suffer the said twelve patentees or persons in whom the said letters patent were vested, their executors, administrators, and assigns, and their clerks or agents, from time to time, and at all reasonable hours in the day, to take copies thereof and extracts therefrom. Provided nevertheless and it was thereby further agreed and declared, that if the said twelve patentees or persons in whom the said letters patent were vested, their executors, administrators, or assigns, should at any time thereafter during the said term of fourteen years, give or grant any licence or authority to any other

person or persons to use or exercise the said invention in England, Wales, Scotland, or Ireland, without similar restrictions and corresponding minimums and maximums, with the excise returns in the ratio thereinbefore stated or mentioned, to the said Samuel Guppy and Philip Protheroe, or at a less rate per ton than the sum of

l. thereinbefore reserved, that then and from thenceforth the covenants and restrictions thereinbefore contained, so far as the same should be omitted, modified, or altered in any such future licence to be granted as aforesaid, should be relinquished and become null and void as against them the said Samuel Guppy and Philip Protheroe, and they should from and after the granting of any such licence as aforesaid, be bound to pay, under and by virtue of the present licence, such sum only per ton of soap, to be thereafter manufactured by them, as any future licensee should be bound to pay by virtue of any such licence to be granted as aforesaid, it being the intention of the parties thereto, that the said Samuel Guppy and Philip Protheroe, should be in all respects on as favourable a footing as all other licensees; and the said twelve patentees or persons in whom the said letters patent were so vested as aforesaid, severally and respectively, and for their several and respective executors, administrators, and assigns, did covenant to, and with the said Samuel Guppy and Philip Protheroe, and the survivor of them, and the executors and administrators of such survivor, that they the said twelve patentees aforesaid, their executors, administrators, or assigns, should not, nor would nor should, nor would any or either of them at any times or time, during the remainder of the said term of fourteen years, for which the said letters patent were granted as aforesaid, if the licence thereby granted should so long continue, make or grant any licences or licence whatever, to any persons or person to use or exercise the said patent invention, in the said

city of Bristol, or within thirty-five miles thereof, without the consent of the said Samuel Guppy and Philip Protheroe, or the survivor of them, first had and obtained. And, further, that the said twelve patentees respectively, their respective executors, administrators, and assigns, should not, nor would, nor should, nor would any or either of them at any times or time during the remainder of the said term of fourteen years for which the said letters patent were so granted as aforesaid, if the licence thereby granted should so long continue, themselves or himself, use or exercise the said patent or invention, or manufacture in the said city of Bristol, or within thirty-five miles thereof. Provided always, and it was thereby declared and agreed by and between the said parties, that if the said Samuel Guppy and Philip Protheroe, or the survivor of them, should omit, refuse, or neglect, to commence and continue the manufacture of soap at the time, and according to the stipulations and agreements thereinbefore contained, or should make default or breach in the performance of any of the other clauses, covenants, and agreements therein contained, that then, and in any such case, it should be lawful for the said twelve patentees, or persons in whom the said letters patent were vested, their executors, administrators, or assigns, to give unto the said Samuel Guppy and Philip Protheroe, three months' notice in writing under their respective hands to revoke and make void the licence, power, and authority therein before given and granted; and that henceforth every covenant, clause, matter, and thing therein contained, should cease, determine, and be void, save and except, and without prejudice to the right of them, the said twelve patentees or persons in whom the said letters patent were vested, their executors, administrators, or assigns, to recover all and every sum and sums of money which should be then due and payable to them, under and by virtue of the present licence.

Under the said licence the said Philip Protheroe and Samuel Guppy, have used and exercised the said patent invention within the said city of Bristol, and such other places within thirty-five miles thereof, as they have thought fit, and they have since assigned the said licence and the benefit thereof, to or in trust for a company or co-partnership consisting of more than twelve persons who are now using and exercising the same, and have duly paid the rents made payable by virtue of the said licence.

On the 2nd day of July 1839, the said twelve patentees or persons in whom the said letters patent, and the liberties and privileges thereof, were so vested as aforesaid, gave and granted twelve other similar exclusive licences to use and exercise the said patent right and invention in twelve several districts other than the said city of Bristol, and places within thirty-five miles thereof, of which said twelve licences, eleven were granted, severally to eleven individuals (that is to say, each to one distinct person) and the twelfth was granted to a certain partnership consisting of thirteen persons.

The districts covered by the licences are parts of England only. They do not comprise the whole of England.

*Copy of Questions submitted to the Court of Exchequer
as to Exclusive Licence.*

1. Has the grant of the said first mentioned exclusive licence to the said Philip Protheroe and Samuel Guppy, invalidated the letters patent of itself, without reference to the subsequent facts ?

2. Has the assignment to, and vesting of, the said first mentioned licence in the said partnership of more than twelve persons, invalidated the letters patent of itself, and without reference to the other facts stated ?

3. Has the grant of the said twelve last mentioned exclusive licences, or of any, and which of them, invalidated the said letters patent?

4. *If the third question should be answered in the affirmative, would the result be the same if the last of the twelve licences had been granted to a less number than twelve persons?

5. If the grantees of all the licences were to coalesce, and become jointly interested in such licences, would the letters patent be thereby invalidated, if not otherwise invalidated?

6. Would the letters patent, if not otherwise invalidated, have been so, if the districts, covered by the licences, had included the whole of England, Wales, and Berwick-upon-Tweed?

7. Would they have been so, if such districts had included the whole of England, Wales, Berwick-upon-Tweed, and the Colonies?

Copy Answers of the Court of Exchequer.

We have heard this case argued by counsel, and considered the same, and are of opinion,

1. That the grant of the first mentioned exclusive licence to the said Philip Protheroe and Samuel Guppy, did not invalidate the letters patent.

2. That the assignment to, and vesting of, the said first mentioned licence in the said partnership of more than twelve persons, did not invalidate the letters patent.

3. That the grant of the said twelve last mentioned exclusive licences, nor of any of them, did not invalidate the said letters patent.

4. That if all the grantees of all the licences were to coalesce, and become jointly interested in such licences, the letters patent would not be thereby invalidated.

* As the third question is answered in the negative, it has rendered this question unnecessary.

5. That the letters patent would not be invalidated, if the districts covered by the licenses, had included the whole of England and Wales, and Berwick-upon-Tweed.

6. That they would not have been so, if such districts had included the whole of England, Wales, Berwick-upon-Tweed, and the Colonies.

Dated this 20th day of November, 1839.

(signed)

ABINGER.

J. PARKE.

J. GURNEY.

R. M. ROLFE.

Particulars of what passed in the Court of Exchequer upon this case being called on for argument on the 18th November, 1839.

Mr. Roupell opened the substance, shortly stating the questions.

Lord Chief Baron.—On which side are you?

Mr. Roupell.—For the licensee.

Lord Chief Baron.—We will hear the other side.

Mr. Rotch.—The principal question is, if all licensees unite, the districts covered by licences being all England, they have an interest equal to patentees.

Baron Parke.—A license is no interest in the patent.

The answer to the first question proposed is clear; then why should they not unite?

Mr. Rotch.—A patent is a monopoly. First question is clear for licence, I admit; but the Vice-Chancellor thought the circumstance of a combination amongst all the licensees might affect the patent. If your lordships are so clear upon the point, I do not desire to occupy time in argument. I am well satisfied that such is the court's de-

cision. The question is one of great public importance.

Baron Parke.—Licensee has a distinct interest. How can a combination affect the patent right. The answer to all the questions must clearly be in the negative.

Lord Chief Baron.—The questions will be answered in the negative.

Before the Vice Chancellor, Friday, November 29, 1839.

JUDGMENT.

Declare that the plaintiffs are entitled under the deed or indenture, dated the July 1, 1839, in the pleadings mentioned, and the covenant in such indenture contained to have granted to him an exclusive licence for the use and exercise of the invention of certain improvements in the manufacture of soap, in the pleadings mentioned, within the city of Bristol, and at such other place or places within thirty-five miles therefrom, as described in the map, with a compass, having Bristol for its centre, as the plaintiffs may think proper, for the term, and upon and under the terms, stipulations, covenants, and agreements, contained and expressed in the same indenture and decree, that the defendants do grant and execute to the plaintiffs such licence accordingly, and that the plaintiffs do execute a duplicate or counterpart thereof, and refer it to the Master in Rotation to settle and approve of such licence, in case the parties differ about the same.—Liberty to apply.

NOTICE OF EXPIRED PATENTS.

(Continued from vol. xii. p. 369.)

JOSEPH FAREY, of Lincoln's Inn Fields, Middlesex, Civil Engineer, for an improvement in lamps.—Sealed July 16, 1825.—(*For copy of specification, see Repertory, Vol. 2, third series, p. 345.*)

THOMAS ROBINSON WILLIAMS, of New Norfolk Street, Strand, Middlesex, Gentleman, for an improved lancet.—Sealed July 16, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 400.*)

THOMAS COOK, of Upper Sussex Place, Kent Road, Surrey, Lieutenant in the Navy, for improvements in the construction of carriages, and on harness to be used therewith, whereby greater safety to the persons riding in such carriages, and other advantages, will be obtained.—Sealed July 16, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 326.*)

JOSEPH CHEESEBOROUGH, of Manchester, Merchant, for a method of conducting to and winding upon spools or bobbins, rovings of cotton, flax, wool, or other fibrous substances. Communicated by a foreigner residing abroad.—Sealed July 16, 1825.

WILLIAM HIRST, Gentleman, and JOSEPH CARTER, Cotton Spinner, both of Leeds, for an apparatus for giving a new motion to mules and billies —Sealed July 16, 1825.

JOHN PALMER DE LA FONS, of George Street, Hanover Square, Dentist, for an improvement for extracting, and method of affixing, teeth.—Sealed July 16, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 306.*)

JONATHAN DOWNTON, of Blackwall, Middlesex, Shipwright, for improvements on machines or pumps.—Sealed July 19, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 125.*)

CHARLES FRIEND, of Bell Lane, Spitalfields, Middlesex, Sugar Refiner, for improvements in the process of refining sugar.—Sealed July 26, 1825.

JOHN REEDHEAD, of Heworth, Durham, Gentleman, for improvements in machinery for propelling vessels of all descriptions, both in marine and inland navigation.—Sealed July 26, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 329.*)

JOHN EDWARD BROOKE, of Headingley, near Leeds, Woollen Manufacturer, and JAMES HARDGRAVE, of Kirkstall, of the same place, Woollen Manufacturer, for improvements in, or additions to, machinery used in scrubbing and carding wool, or other fibrous substances.—Sealed July 26, 1825.

DAVID OLIVER RICHARDSON, Kerseymere, and Cloth Printer, and

WILLIAM HIRST, Manufacturer, both of Leeds, for improvements in the process of printing or dyeing woollen and other fabrics—Sealed July 26, 1825.—(*For copy of specification, see Repertory, Vol. 3, third series, p. 257.*)

JAMES KAY, of Preston, Lancashire, Cotton Spinner, for machinery for preparing and spinning flax, hemp, and other fibrous substances, by power.—Sealed July 26, 1825.—(*For account of specification see, Repertory, Vol. 2, third series, p. 317.*)

RICHARD WITTY, of Sculcoates, Yorkshire, Civil Engineer, for an improved chimney for Argand and other burners.—Sealed July 30, 1825.

JOEL LEAN, of Fishpond House, near Bristol, Gentleman, for a machine for effecting an alternating motion between bodies revolving about a common centre or axis of motion; also certain additional machinery or apparatus for applying the same to mechanical purposes.—Sealed July 30, 1825.—(*For copy of specification, see Repertory, Vol. 4, third series, p. 132.*)

The **REV. WILLIAM BARCLAY**, of Auldeare, Nairnshire, for an improved instrument to determine angles of altitude or elevation, without the necessity of a view of horizon being obtained.—Sealed July 30, 1825.

RICHARD BADNALL, the Younger, of Leek, Staffordshire, Silk Manufacturer, for improvements in the manufacture of silk.—Sealed July 30, 1825.—(*For copy of specification, see Repertory, Vol. 2, third series, p. 227.*)

SAMUEL BAGSHAW, of Newcastle-under-Lyne, Staffordshire, Gentleman, for a new method of manufacturing pipes for the conveyance of water and other fluids.—Sealed August 8, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 42.*)

GEORGE CHARLETON, of Maidenhead Court, Wapping, and **WILLIAM WALKER**, of New Grove, Mile-end Road, Stepney, Master Mariners, for improvements in the building or constructing of ships or other vessels.—Sealed August 10, 1825.—(*For copy of specification, see Repertory, Vol. 3, third series, p. 211.*)

SAMUEL LORD, **JAMES ROBINSON**, and **JOHN FORSTER**, of Leeds, Yorkshire, copartners, Merchants and Manufacturers, for improvements in machinery for and in the process of raising the pile on woollen cloths and other fabrics, and also in pressing the same.—Sealed August 11, 1825.

WILLIAM HIRST, **HENRY HIRST**, and **WILLIAM HEYCOCK**, Woollen Cloth Manufacturers, and **SAMUEL WILKINSON**, Mechanic, of Leeds, Yorkshire, for an apparatus for preventing coaches, carriages, mails, and other vehicles, from overturning.—Sealed August 11, 1825.

JOHN STEPHEN LANGTON, of Langton Juxta Partney, Lincolnshire,

Esquire, for an improved method of seasoning timber and other wood.—Sealed August 11, 1825.—(*For copy of specification, see Repertory, Vol. 6, third series, p. 228.*)

JACOB PERKINS, of Fleet Street, London, Engineer, for improvements in the construction of bedsteads, sofas, and other similar articles. Communicated by a foreigner residing abroad.—Sealed August 11, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 249.*)

HENRY RICHARDSON FANSHAW, of Addle Street, London, Silk Embosser, for an improved apparatus for spinning, doubling, and twisting, or throwing silk.—Sealed August 12, 1825.

JAMES BUTLER, of No. 64, Commercial Road, Lambeth, Surrey, for a method of making coffins for the effectual prevention of bodies being removed therefrom, or taken therefrom, after interment.—Sealed August 12, 1825.

MARC LARIVIERE, now residing at No. 21, Frith Street, Soho, Middlesex, Mechanician, late of Geneva, in Switzerland, for a machine for perforating metal plates of gold, silver, tin, platina, brass, or copper, being applicable to all the purposes of sieves, hitherto employing either canvas, linen, or wire.—Sealed August 15, 1825.

JOSEPH ALEXANDER TAYLOR, of Great St. Helen's, London, Gentleman, for a new polishing apparatus for household purposes.—Sealed August 13, 1825.

CHARLES DOWNING, of Bideford, Devonshire, Gentleman, for improvements in fowling-pieces and other fire-arms.—Sealed August 15, 1825.

ANDREW SHOOLBRED, of Jermyn Street, St. James's, Tailor, for improvements on, or a substitute for, back stays and braces for ladies and gentlemen, chiefly to prevent relaxation of the muscles.—August 18, 1825.

PHILIP TAYLOR, of the City Road, Middlesex, Engineer, for improvements in making iron.—Sealed August 18, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 250.*)

PETER WILKINS, of Leeds, and JAMES OGLE, of Holbeck, Yorkshire, Cloth Manufacturers, for improvements in fulling mills, or machinery for fulling and washing woollen cloths, or such other fabrics as may require the process of felting or fulling.—Sealed August 20, 1825.

GEORGE HENRY LYNE, of John Street, Blackfriars Road, Machinist and Engineer, and THOMAS STANIFORD, of the Grove, Great Guildford Street, Southwark, Smith and Engineer, for improvements in machinery for making bricks.—Sealed August 23, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 43.*)

WILLIAM PARR, of Union Place, City Road, Middlesex, Gentle-

man, for an improvement or improvements in the mode of propelling vessels.—Sealed August 27, 1825.—(*For copy of specification, see Repertory, Vol. 4, third series, p. 1.*)

JOHN BOWLER, of Nelson Square, Blackfriars Road, Surrey, and THOMAS GALON, of the Strand, Middlesex, Hat Manufacturers, for certain improvements in the construction or manufacture of hats.—Sealed August 27, 1825.

CHARLES MERCY, of Edward's Buildings, Stoke Newington, Middlesex, Gentleman, for improvements in propelling vessels.—Sealed September 8, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 263.*)

WILLIAM JEFFERIES, of 46, London Street, Radcliffe Cross, Middlesex, Brass Manufacturer, for a machine for impelling power without the aid of fire, water, or air.—Sealed September 15, 1825.

JEAN ANTOINE TEISSIER, of Tottenham Court Road, Middlesex, Gentleman, for improvements in steam-engines. Communicated to him by a foreigner.—Sealed September 15, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 335.*)

CATHCART DEMPSTER, of Lawrence Pountney Hill, London, Gentleman, for improved cordage.—Sealed September 15, 1825.

GEORGE HOLWORTHY PALMER, of the Royal Mint, Civil Engineer, for a new arrangement of machinery for propelling vessels through the water, to be effected by steam or any other power.—Sealed September 15, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 457.*)

ADAM EVE, of South, Lincolnshire, Carpet Manufacturer, for improvements in manufacturing carpets, which he intends to denominate Prince's Patent Union Carpet. Communicated to him by a foreigner.—Sealed September 15, 1825.

ISAIAH LUKENS, late of Philadelphia, but now of Adam Street, Adelphi, Middlesex, Machinist, for an instrument for destroying the stone in the bladder, without cutting, which he denominates Lithontripton.—Sealed September 15, 1825.—(*For copy of specification, see Repertory, Vol. 4, third series, p. 262.*)

SIR THOMAS COCHRANE, Knight (commonly called Lord Cochrane) of Tunbridge Wells, Kent, for a new method of propelling ships, vessels, and boats at sea.—Sealed September 15, 1825.

CHARLES JACOMB, of Basinghall Street, Wool Broker, for improvements in the construction of furnaces, stoves, grates, and fire-places.—Sealed September 15, 1825.—(*For account of specification, see Repertory, Vol. 2, third series, p. 453.*)

WILLIAM DUESBURY, of Boasal, Derbyshire, Colour Manufacturer, for a mode of preparing or manufacturing of a white, from the impure native sulphate of barytes.—Sealed September 29, 1825.

JOHN MARTINEAU, the younger, of the City Road, Middlesex, Engineer, and HENRY WILLIAM SMITH, of Lawrence Pountney Place, in the city of London, Esquire, for improvements in the manufacture of steel. Communicated by a foreigner residing abroad.—Sealed October 6, 1825.—(*For copy of specification, see Repertory, Vol. 3, third series, p. 205.*)

SIR GEORGE CAYLEY, of Brompton, Yorkshire, Baronet, for a new locomotive apparatus.—Sealed October 6, 1825.

JAMES SHUDI BROADWOOD, of Great Pultney Street, Middlesex, Pianoforte Maker, for improvements in small, or what are commonly called square piano-fortes.—Sealed October 6, 1825.

THOMAS HOWARD, of New Broad Street, London, Merchant, for a vapour engine.—Sealed October 13, 1825.—(*For copy of specification, see Repertory, Vol. 4, third series, p. 65.*)

NATHANIEL KIMBALL, of New York, Merchant, for a process of converting iron into steel. Communicated by a foreigner residing abroad.—Sealed October 13, 1825.—(*For copy of specification, see Repertory, Vol. 6, third series, p. 276.*)

BENJAMIN SAUNDERS, of Bromsgrove, Worcestershire, Button Manufacturer, for improvements in constructing or making of buttons.—Sealed October 13, 1825.

THOMAS DWYER, of Lower Ridge Street, Dublin, Silk Manufacturer, for improvements in the manufacture of buttons.—Sealed October 13, 1825.

JOSEPH CLISILD DANIELL, of Stoke, Wilts, Clothier, for improvements in machinery applicable to the weaving of woollen cloth.—Sealed October 13, 1825.

JOSIAH EASTON, of Bradford, Somersetshire, Esquire, for improvements in locomotive or steam carriages; and also in the manner of constructing the roads or ways for the same to travel over.—Sealed October 13, 1825.

WILLIAM HIRST, JOHN WOOD, and JOHN ROGERSON, of Leeds, for improvements in machinery for raising and dressing of cloth.—Sealed October 21, 1825.

RALPH STEPHEN PEMBERTON, and JOHN MORGAN, of Lanely, Carmarthenshire, for a consolidated or combined drawing and forcing pump.—Sealed October 21, 1825.—(*For account of specification see Repertory, Vol. 3, third series, p. 48.*)

GOLDSWORTHY GURNEY, of Argyle Street, Middlesex, Surgeon, for improvements in the apparatus for raising and generating steam.—Sealed October 21, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 173.*)

LEMUEL WELLMAN WRIGHT, of Princes Street, Lambeth, Surrey, Engineer, for improvements in the construction of steam-engines.—

Sealed October 21, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 114.*)

HENRY CONSTANTINE JENNINGS, of Devonshire Street, Middlesex, Practical Chemist, for improvements in the process of refining sugar.—Sealed October 22, 1825.—(*For copy of specification, see Repertory, Vol. 6, third series, p. 335.*)

THOMAS STEELE, of Magdalen College, Cambridge, Esquire, for improvements in the construction of diving bells or apparatus for diving under water.—Sealed October 28, 1825.—(*For copy of specification, see Repertory, Vol. 4, third series, p. 80*)

JOHN and SAMUEL SEAWARD, of Poplar, Middlesex, Engineers, for a new or improved method or methods of propelling boats, craft, and all kinds of vessels, on canals, rivers, and other shallow waters. Sealed November 1, 1825.—(*For copy of specification, see Repertory, Vol. 7, third series, p. 16.*)

WILLIAM RANYARD, of Kingston, Surrey, Tallow Chandler, for a circumvolution brush and handle.—Sealed November 1, 1825.

VERNON ROYLE, of Manchester, Silk Manufacturer, for improvements in the machinery for cleaning and spinning of silk.—Sealed November 1, 1825.

JOHN ISAAC HAWKINS, of Pancras Vale, Middlesex, Civil Engineer, for improvements on certain implements, machines, or apparatus, used in the manufacturing and preserving of books, whether bound or unbound.—Sealed November 1, 1825.

JOHN RIDGWAY and WILLIAM RIDGWAY, both of the Staffordshire Potteries, manufacturers of china, stone, and earthenware, for an improved cock, tap, or valve, for drawing off liquors.—Sealed November 1, 1825.

THOMAS SEATON, of Bermondsey, Surrey, Shipwright, for improvements on wheeled carriages.—Sealed November 7, 1825.—(*For account of specification, see Repertory, Vol. 5, third series, p. 110*)

GEORGE HUNTER, of Edinburgh, late Clothier, for an improvement in the construction, use, and application of wheels.—Sealed November 7, 1825.—(*For account of specification, see Repertory, Vol. 6, third series, p. 436*)

THOMAS SHAW BRANDRETH, of Liverpool, Esquire, for an improved mode of constructing wheel carriages.—Sealed November 8, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 112.*)

SAMUEL BROWN, of Old Brompton, Middlesex, Gentleman, for improvements in machinery for making and manufacturing casks and other vessels.—Sealed November 8, 1825.

WILLIAM ERSKINE COCHRANE, of Regent Street, Middlesex, for an improvement in cooking apparatus.—Sealed November 8, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 121.*)

JOHN WILLIAM HIORT, Office of Works, Whitehall, Architect, for an improved chimney or flue, for domestic and other purposes — Sealed November 8, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 117.*)

CHARLES LOUIS GIROUD, of Lyons, in the kingdom of France, for a chemical substitute for gall nuts in all the different branches of the arts or manufactures in which gall nuts have been accustomed or may hereafter be used.—Sealed November 8, 1825.

JAMES WILKS, of Rochdale, Lancashire, Tin-plate Worker, and **JOHN ERROYD**, of the same place, Grocer, for an engine for cutting nails, sprigs, and sparables, on an improved system.—Sealed November 8, 1825.

JOHN JAMES ALEXANDER M'CARTHY, of Pall Mall Place, Westminster, for new or improved pavement, pitching, or covering, for streets, roads, ways, and places.—Sealed November 10, 1825.

BENJAMIN COOK, of Birmingham, Brass Founder, for a new method of rendering ships' cables and anchors more secure, and less liable to strain and injury while the vessel lays at anchor.—Sealed November 10, 1825.

BENJAMIN COOK, of Birmingham, Brass Founder, for improvements in the binding of books and portfolios of various descriptions.—Sealed November 10, 1825.

JOHANN GEORGE DEYERLEIN, of Mercer Street, Middlesex, Smith and Tool Maker, for improvements on weighing machines, which machines he denominates German weigh-bridges. Communicated by a foreigner residing abroad.—Sealed November 10, 1825.

SAMUEL PARKER, of Argyle Street, Middlesex, Bronze and Iron Founder, and **WILLIAM FRANCIS HAMILTON**, of Nelson Street, Long Lane, Surrey, Engineer, for a certain alloy or alloys of metals.—Sealed November 12, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 249.*)

EDWARD BOWRING, of Goldsmith Street, London, Silk Manufacturer, and **ROBERT STAMP**, of Buxted, Sussex, Weaver, for improvements in the working, weaving, or preparing silk and other fibrous materials, used in making hats, bonnets, shawls, and other materials.—Sealed November 17, 1825.

(*To be continued.*)

PATENTS GRANTED FOR SCOTLAND,

(From December 23, 1839, to January 20, 1840.)

JAMES HAY, of Belton, in the county of Haddington, Scotland, Captain in the Royal Navy, for an improved plough,—“The Belton Plough.”—Sealed December 23, 1839.

CHRISTOPHER NICKELS, of the York Road, Lambeth, in the county of Surrey, Gentleman, for improvements in propelling carriages. Communicated by a foreigner residing abroad.—Sealed December 24, 1839.

JOSEPH GIBBS, of Kennington, in the county of Surrey, Engineer, for an improvement or improvements in the machinery for preparing fibrous substances for spinning, and in the mode of spinning certain fibrous substances.—Sealed December 24, 1839.

THOMAS EDMONTON, of Manchester, in the county of Lancaster, Clerk, for certain improvements in printing-presses.—Sealed December 31, 1839.

JAMES NASMYTH, of Paticroft, near Manchester, in the county of Lancaster, Engineer, for certain improvements applicable to railway carriages.—Sealed December 31, 1839.

THOMAS LAURENTE LAMY GODARD, of Christopher's Street, Finsbury Square, in the City of London, Merchant, for improvements in looms for weaving, to be worked by steam or other power.—Communicated by a foreigner residing abroad.—Sealed January 8, 1840.

JOHN BRADFORD FURNIVAL, of Street Ashton, in the county of Warwick, Farmer, for improvements in apparatus or materials, to prevent persons and quadrupeds sinking when in the water.—Communicated by a foreigner residing abroad.—Sealed January 8, 1840.

GEORGE WILTON TURNER, late of Park Village, Regent's Park, in the county of Middlesex, but now of the town and county of the town of Newcastle-upon-Tyne, Doctor of Philosophy, and **HERBERT MINTON**, of Longfield Cottage, in

the parish of Stoke-upon-Trent, in the county of Stafford, Manufacturer, for an improved porcelain.—Sealed January 9, 1840.

RICHARD BEARD, of Egremont Place, New Road, in the county of Middlesex, Gentleman, for improvements in printing calicoes and other fabrics.—Communicated by a foreigner residing abroad.—Sealed January 9, 1840.

ALEXANDER FRANCIS CAMPBELL, of Plumpstead, in the county of Norfolk, Esquire, and **CHARLES WHITE**, of the city of Norwich, Mechanic, for improvements in ploughs, parts of which improvements are applicable to harrows and other agricultural implements.—Sealed January 9, 1840.

ROBERT MONTGOMERY, of Johnston, in the county of Renfrew, in the kingdom of Scotland, Gentleman, for an improvement or improvements in spinning machinery, applicable to mules, jennies, slubbers, and other similar mechanism.—Sealed January 9, 1840.

WILLIAM VICKERS, of Firs Hill, in the county of York, Steel Manufacturer, for an improvement in the manufacture of cast-steel. Communicated by a foreigner residing abroad.—Sealed January 10, 1840.

CHRISTOPHER EDWARD DAMPIER, of Ware, in the county of Hertford, Attorney-at-law, for an improved weighing-machine.—Sealed January 14, 1840.

JOHN LESLIE, of Conduit Street, Hanover Square, in the county of Middlesex, Tailor to Her Majesty, for improvements in measuring the human figure. Communicated by a foreigner residing abroad.—Sealed January 15, 1840.

WILLIAM HARPER, of Cowper's Court, Cornhill, in the city of London, Patent Stove Manufacturer, and **THOMAS WALKER**, of Birmingham, in the county of Warwick, for improvements in stoves and grates, and in preparing metal plates for such stoves, and for other purposes.—Sealed January 15, 1840.

MATTHEW HEATH, of Furnival's Inn, in the city of London, Gentleman, for improvements in clarifying and

filtering water, beer, wine, and other liquids. Communicated by a foreigner residing abroad.—Sealed January 15, 1840.

THOMAS CLARK and **CHARLES CLARK**, of Wolverhampton, in the county of Stafford, Iron Founders and co-partners, for improvements in glazing and enamelling cast-iron hollow ware.—Sealed January 15, 1840.

JOHN AINSLIE, Farmer, Redheugh, near Dalkeith, for a new and improved mode of making or moulding tiles, bricks, retorts, and all such like work, from clay.—Sealed January 20, 1840.

SAMUEL WHITE WHITE, of Charlton Marshall, in the county of Dorset, Esquire, for improvements in preventing persons from being drowned.—Sealed January 20, 1840.

ARTHUR ELDERED WALKER, of Milton Street, Euston Square, Engraver, for improvements in engraving by machinery.—Sealed January 20, 1840.

LIST OF NEW PATENTS.

JOHN LEO NICOLAS, of the Parish of Clifton, Bristol, Gentlemen, for certain improvements in the method of constructing and propelling carriages on railways or common roads, and through fields for agricultural purposes.—Sealed January 1, 1840.—(*Six months.*)

SAMUEL LAWSON, of Leeds, and **JOHN LAWSON**, of the same place, Engineers, and Co-partners, for improvements in machinery for spinning, doubling, and twisting flax, wool, silk, cotton, and other fibrous substances.—Communicated by a foreigner residing abroad.—Sealed January 2, 1840.—(*Six months.*)

CHARLES GREENWAY, of Douglas, in the Isle of Man, Esquire, for certain improvements in reducing friction in wheels of carriages, which improvements are also applicable to bearings and journals of machinery.—Sealed January 3, 1840.—(*Six months.*)

JOHN FRANCOIS VICTOR FABIEN, of King William Street, in the city of London, Gentleman, for improvements in pumps. — Sealed January 7, 1840. — (*Six months.*)

DAVID LOW, of Adam's Court, Old Broad Street, Merchant, for improvements in machinery for crushing, preparing, and combing flax, hemp, phormium tenax, and other fibrous substances. Communicated by a foreigner residing abroad. — Sealed January 7, 1840. — (*Six months.*)

MOSES POOLE, of Lincoln's Inn, Gentleman, for improvements in obtaining power. Communicated by a foreigner residing abroad. — Sealed January 7, 1840. — (*Six months.*)

JOHN RIDGWAY, of Cauldon Place, Stafford, China Manufacturer, for an improvement in the moulds used in the manufacture of earthenware, porcelain, and other similar substances, whereby such moulds are rendered more durable. — Sealed January 11, 1840. — (*Six months.*)

JOHN RIDGWAY, of Cauldon Place, Stafford, China Manufacturer, and **GEORGE WALL**, the younger, of the same place, Gentleman, for certain improvements in the manufacture of china and earthenware, and in the apparatus or machinery applicable thereto. — Sealed January 11, 1840. — (*Six months.*)

JOHN RIDGWAY, of Cauldon Place, Stafford, China Manufacturer, and **GEORGE WALL**, the younger, of the same place, Gentleman, for certain improvements in the mode of preparing bats of earthenware and porcelain clays, and forming or shaping them into articles of earthenware and porcelain, and in the machinery or apparatus applicable thereto. — Sealed January 11, 1840. — (*Six months.*)

ROBERT MONTGOMERY, of Johnstone, in the county of Renfrew, Gentleman, for an improvement or improvements in spinning machinery, applicable to mules, jennies, slubbers, and other similar mechanism. — Sealed January 11, 1840. — (*Six months.*)

CHRISTOPHER EDWARD DAMPIER, of Ware, Attorney

at Law, for an improved weighing machine.—Sealed January 14, 1840.—(*Four months.*)

HEZEKIAH MARSHALL, of the city of Canterbury, Architect, for improvements in window sashes and frames, and in the fastening of window sashes.—Sealed January 14, 1840.—(*Six months.*)

ARTHUR ELDRED WALKER, of Melton Street, Euston Square, Engineer, for improvements in engraving by machinery.—Sealed January 14, 1840.—(*Six months.*)

CHARLES WHEATSTONE, of Conduit Street, Hanover Square, Esquire, and **WILLIAM FOTHERGILL COOKE**, of Sussex Cottage, Slough, Esquire, for improvements in giving signals and sounding alarms at distant places by means of electric currents.—Sealed January 21, 1840.—(*Six months.*)

SAMUEL BROWN, of Finsbury Pavement, Civil Engineer, for improvements in making casks and vessels, of or from iron, and other metals.—Sealed January 21, 1840.—(*Six months.*)

JOSEPH ROCK COOPER, of Birmingham, Gun Maker, for improvements in fire-arms, and in the bullets to be used therewith.—Sealed January 21, 1840.—(*Six months.*)

WILLIAM STONE, of Winsley, Gentleman, for improvements in the manufacture of wine.—Sealed January 21, 1840.—(*Six months.*)

JAMES HALL, of Glasgow, Upholsterer, for improvements in beds, mattresses, and apparatus applicable to bedsteads, coaches, and chairs.—Sealed January 21, 1840.—(*Six months.*)

ARTHUR HOWE HOLDSWORTH, of Brookhill, Devon, Esquire, for improvements in preserving wood from decay.—Sealed January 21, 1840.—(*Six months.*)

WILLIAM COLTMAN, of Leicester, Frame Smith, and **JOSEPH WALE**, of the same place, Frame Smith, for improvements in machinery employed in making framework, knitting, or stocking fabrics.—Sealed January 21, 1840.—(*Six months.*)

SAMUEL WILKES, of Darlston, Iron Founder, for im-

provements in the manufacture of hinges.—Sealed January 21, 1840.—(*Six months.*)

GEORGE WILSON, of Saint Martin's Court, Saint Martin's Lane, for an improved paper cutting machine.—Sealed January 21, 1840.—(*Six months.*)

CHARLES ROWLEY, of Birmingham, Stamper and Piercer, and BENJAMIN WAKEFIELD, of Bordesley, Machinist, for improved methods of cutting out, stamping, or forming, and piercing buttons, shells, and backs for buttons, washers, or other articles, from metal plate, with improved machinery and tools for those purposes.—Sealed January 21, 1840.—(*Six months.*)

EDWARD HALLIDAY, of Leeds, Cloth Manufacturer, for improvements in machinery for raising pile on woollen and other fabrics.—Sealed January 21, 1840.—(*Six months.*)

WILLIAM HUNT of the Portugal Hotel, Fleet Street, London, Manufacturing Chemist, for improvements in the manufacture of potash and soda, and their carbonates.—Sealed January 21, 1840.—(*Six months.*)

MILES BERRY, of Chancery Lane, Patent Agent, for certain improvements in the manufacture of prussiate of potash and prussiate of soda. Communicated by a foreigner residing abroad.—Sealed January 21, 1840.—(*Six months.*)

JULES ALPHONSE SIMON DE GOURNAY, of Bread Street, London, Gentleman, for improvements in the manufacture of horse-shoes. Communicated by a foreigner residing abroad.—Sealed January 21, 1840.—(*Six months.*)

GEORGE CLARKE, of Manchester, Manufacturer, for certain improvements in the construction of looms for weaving.—Sealed January 21, 1840.—(*Six months.*)

ALEXANDER HOLT, of Gower Street, Bedford Square, Surgeon, for certain improvements in the arrangement and construction of fire-grates, or fire-places, applicable to various purposes.—Sealed January 23, 1840.—(*Six months.*)

JAMES BINGHAM, of Sheffield, Manufacturer, and **JOHN AMORY BODEN**, of the same place, Manufacturer, for certain improved compositions, which are made to resemble ivory, bone, horn, mother-o'-pearl, and other substances, applicable to the manufacture of handles of knives, forks, and razors, pianoforte-keys, snuff-boxes, and various other articles.—Sealed January 25, 1840.—(*Six months.*)

JAMES SMITH, Junior, and **FRANCIS SMITH**, of Spital Works, near Chesterfield, Lace Manufacturers, for certain improvements in machinery for the manufacture of figured bobbin-net or lace.—Sealed January 23, 1840.—(*Six months.*)

THOMAS AITKEN, of Chadderton, Manufacturer, for certain improvements in the machinery or apparatus for drawing cotton and other fibrous substances.—Sealed January 28, 1840.—(*Six months.*)

WILLIAM PONTIFEX, of Shoe Lane, in the city of London, Coppersmith, for an improvement in treating fluids containing colouring matter to obtain the colouring matter therefrom.—Sealed January 28, 1840.—(*Six months.*)

HENRY CURZON, of the borough of Kidderminster, Machinist, for certain improvements in steam-engines.—Sealed January 28, 1840.—(*Six months.*)

JOHN WHITEHOUSE, of West Bromwich, in the county of Stafford, Iron Master, for improvements in preparing and rolling iron, and other metals, or metallic alloys, for the manufacture of certain articles of commerce.—Sealed January 28, 1840.—(*Six months.*)

WILLIAM MOTTERSHAW FORMAN, of Sheepshead, in the county of Leicester, Frame Smith, for certain improvements in stocking frames, and machinery used in frame-work knitting.—Sealed January 28, 1840.—(*Six months.*)

THE
REPERTORY
OF
PATENT INVENTIONS.

No. LXXV. NEW SERIES.—MARCH, 1840.

Specification of the Patent granted to MORTON WILLIAM LAWRENCE, of Leman Street, Goodman's Fields, in the County of Middlesex, Sugar Refiner, for certain Improvements in the Process of Concentrating certain Vegetable Juices and Saccharine Solutions.—Scaled March 8, 1838.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said Morton William Lawrence, do hereby declare that the nature of my said invention and the manner in which the same is to be performed, are as follows; firstly, I take any vegetable juice or saccharine solution capable of yielding sugar on evaporation, and which is commonly used for that purpose by sugar manufacturers, and I evaporate such juice or solution by boiling it in an open vessel (by which expression I, throughout this specification, mean a vessel left open to the atmospheric pressure), to a point of concentration short of that to which I intend ultimately to bring it, but as near thereto as I consider attainable in such open vessel, without risk of injury to

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the juice or solution. The precise point of concentration to which it will be desirable thus to bring the juice or solution, in the open vessel, must be determined, in every particular case, by the judgment of the operator, who will be guided and governed therein by the treatment he proposes, or the use he intends to make of the juice or solution after concentration, and by the quality and condition of the material on which he is operating. But, in general, as soon as the juice or solution begins to come to proof, that is, to exhibit such degree of viscosity as allows of a thread being drawn in it between the finger and thumb, the boiling in the open vessel should be discontinued. I have in practice found that the requisite degree of viscosity is obtained by the time the juice or solution is brought in the open vessel, to a temperature varying from 228° to 236° Fahrenheit. I do not judge it advisable under any circumstances to exceed 236° Fahrenheit. The other point also, videlicet, that point of concentration to which the juice or solution is ultimately to be brought, must depend upon the views of the operator, in reference to its subsequent treatment or intended use, but having brought it, in the open vessel, to the degree of concentration above mentioned and described as attainable, at a temperature lying between 228° and 236° Fahrenheit, he will have it in his power to bring it to a much higher degree of concentration, and to such a degree as will be quite high enough for any practical purpose, by pursuing the treatment I am about to describe.

Having boiled the juice or solution in the open vessel to the point described, I transfer it, with as little loss of heat as possible, into a close vessel, either of the same kind as the vacuum vessels now used in the ordinary vacuum process of sugar boiling, or into one, the improved construction of which, and the mode of using which are hereafter described. A vacuum, advancing, as the process proceeds, to a degree supporting not more than three or four inches of mercury (as indicated by a gauge made to communicate with the exhausted space

or vacuum), being produced and maintained in the close vessel by the action of an air-pump or other known means, the juice or solution, already heated to a high degree, will undergo a further evaporation, and speedily reach a high degree of concentration, while the vapour produced may be carried off and condensed by any of the contrivances usually employed for such purposes. This process of evaporation and concentration in vacuo may be carried on and completed in the close vessel, either with or without the supply of further heat to it, or to the juice or solution, whilst it remains therein. I find that I can thus, without supply of further heat, concentrate the juice or solution to a point high enough for any practical purposes. But in many cases, and especially where it is proposed that the concentrated juice or solution, or, in other words, the mass resulting from such concentration should, after quitting the close vessel be transferred into moulds, I find it preferable to supply heat to the close vessel (in any of the usual modes) during the evaporation of the juice or solution in vacuo, and the concentrated juice or solution (or mass resulting from the concentration,) may, by this method, be sustained in the vacuum at a temperature not lower than 180° Fahrenheit, or if it be deemed expedient to let it fall below that temperature, it may be restored to such temperature, and then transferred at once from the close vessel into the moulds, without first heating it up after it quits the close vessel. And it is to be observed, that when heat is supplied to the close vessel during the process of evaporation, a less perfect vacuum will suffice, but the vacuum and the supply of heat ought to be so regulated that the said juice or mass should not boil over. When evaporation has taken place in the close vessel to the point at which the operator wishes it to stop, the air may be admitted, and the operation of concentration is finished. When I do not supply heat to the close vessel during evaporation, I judge of the degree to which concentration has taken place, by obser-

vation of a thermometer, fixed in the cover of the vessel and descending into the juice or solution; for I find in practice that the increase of density in the juice or solution, when no heat is applied during its evaporation in the close vessel, very nearly corresponds with the fall of temperature, as indicated by the thermometer inserted therein, allowance being made for such circumstances as readily present themselves to any experienced operator. Thus, in general, I find that if the juice or solution be at a temperature of 234° or 235° Fahrenheit, or thereabouts, when it is removed from the open vessel, and the process of evaporation be forthwith carried on in the close vessel, without supply of further heat, a sufficiently high point of concentration for any practical purpose will have been attained by the time the thermometer, so inserted as aforesaid, falls from a temperature varying from 140° to 150° Fahrenheit, and even when heat is supplied to the close vessel, during the process of evaporation therein the observation of the thermometer will still generally enable an experienced workman to judge of the degree of concentration which the juice or solution has attained in the close vessel; but in such case I provide myself with a proof-stick, such as is in use in the ordinary vacuum process of sugar boiling, by aid of which I can draw out and inspect a portion of the juice and solution contained in the close vessel, without disturbing the vacuum, and I can also use the proof-stick even when I do not apply heat to the close vessel, if, for more complete satisfaction, I desire to do so. By the process thus described, I escape all the necessity of heating the juices or solutions in an open vessel to certain degrees known to be injurious to such juices and solutions while in such open vessel, and I nevertheless obtain a considerable abridgement and simplification of the vacuum process as now practised, and I can either abstain altogether from the use of heat applied during the evaporation in vacuo, or I can use it partially, and moderately, or continuously. And I do declare that

my invention, for which the present patent is obtained, in so far as regards this first part of my improvements in the process of concentrating certain vegetable juices and saccharine solutions, does consist in first evaporating, in an open vessel, the juices and solutions, before described, to a point of concentration as near that which I desire them ultimately to attain as they can be safely made to attain in such open vessel, and then completing the concentration by further evaporating such juices and solutions in vacuo, either with or without the application of heat during such evaporation in vacuo, and whether such last-mentioned evaporation be carried on in any close vessel of the kinds now in use, or in any close vessel of either of the kinds hereinafter described, as subservient to which operation I have pointed out methods (which I do not, however, claim to have invented) of ascertaining from time to time the density of the juices or solutions proposed to be so concentrated; and, secondly, I do declare as one of my said improvements in the process of concentrating certain vegetable juices and saccharine solutions, that I construct and use the close vessel in which the juice or solution is to be evaporated in vacuo, in one or other of the two manners hereafter described.

Description of the Drawing.

The first manner of construction is represented in the drawings hereunto annexed, number 1, and the mode of constructing and using it, as follows: The lower part of the vessel may conveniently consist of a copper or iron pan, in size and form resembling the vessel called a cooler in ordinary sugar-houses, but the bottom of it should be somewhat curved downwards, for the better resisting atmospheric pressure, when the air from within comes to be exhausted (B, No. 1), when it is not intended to apply heat to it during the process of evaporation in vacuo, it is desirable to enclose the lower part of the vessel in a casing of wood (C, No. 1), containing saw-

dust, charcoal, or other non-conducting substance, with the view of checking the escape of heat through the metal. When it is intended to apply heat to the close vessel, this casing of wood should not be used, but another sort of casing, adapted to the purpose of administering heat to vessels of a similar form, must be employed, and such sorts of casings and modes of applying heat, are too well known to require description.

The upper part or cover of the vessel (k, No. 1), may also be conveniently constructed of copper, and it should be made so as to drop into the lower part, and to rest, when down, upon the interior surface of the bottom of such lower part. How much of such interior surface shall be inclosed by the copper when so dropped, must, of course, depend upon the size of the cover, relatively to the size of the bottom. I recommend however, the cover of the vessel to be so constructed, that when let down upon the bottom, it may enclose nearly the whole thereof; this cover is made with a flanch (n, No. 1), about two inches wide, running along the edge thereof, and to the lower side of the flanch a packing of sail-cloth, or some similar compressible material, of the same width as the flanch, in folds or pieces, of which I have found eight to form a sufficient thickness, is rivetted or attached by any other convenient fastening. The cover is furnished with a neck (p, No. 1), in the manner of the head of a still, and this neck being formed so as to turn downwards at its extremity, dips when let down into a pipe (g, No. 1), placed to receive it, and is furnished at such extremity with a packing, which being occasionally moistened by a small quantity of water, will have the effect of keeping the junction between the pipe and the neck air-tight, permitting at the same time the neck to be raised and lowered with the cover. This pipe must be firmly fixed, and have a communication (h, No. 1) with a condensing and exhausting apparatus, which may be of any of the known kinds, and need not, therefore, be particularly de-

scribed. It is convenient to have a small aperture, which may be stopped by a cork or stop-cock, in some part of the cover, for the purpose of admitting air without raising the cover. The mode of using the vessel so constructed, is as follows : The juice or solution having, in the open vessel, been brought to the desired temperature, as pointed out in the former part of this my specification, the close vessel is prepared for receiving it, by dropping the cover into the lower part, till the flanch of the cover barely rests upon the interior surface of the bottom of such lower part, the extremity of the neck at the same time entering the pipe, and the juice or solution is then transferred into the close vessel flowing into that portion of it which is covered, partly through a small orifice made for the purpose in the cover, close to and above the flanch, and partly under the flanch, which, in this state of the process has not been fixed down to the exhaustion of the air from within the cover, as then commenced by the action of the air-pump, or other known means, and the flanch of the cover, with the packing attached, becomes firmly and closely fixed down by the atmospheric pressure, so as to form an air-tight junction, the juice or solution is readily sucked in through the orifice before described ; when it has nearly all entered, a plug with a handle is applied by hand to stop the orifice, and the juice or solution within the cover being then confined, and the exhaustion of the air and condensation of the vapour proceeding by means of the exhausting and condensing apparatus before alluded to, a rapid evaporation takes place, till the requisite point of concentration is reached. The speed of the operation may be retarded at the pleasure of the operator, by a moderate use of the air-pump, or by a partial or occasional admission of air through the aperture in the cover above mentioned, or by any of these means.

My second manner of constructing and using the close vessel is represented in the drawings hereunto annexed, No. 2 and No. 3, and the mode of constructing and using it is as follows. The lower part may consist of a copper

or iron pan, of a hemispherical, elliptical, or some other convenient shape for the purpose of resisting atmospheric pressure, of the usual size of sugar-pans (B, No. 2 and No. 3), cased in the mode or modes above mentioned, according as the operator may wish to apply or not to apply heat during the process of evaporation, and having a flanch of from three to five inches broad running along the edge thereof, (A, No. 2 and No. 3,) which flanch is provided with rims at its external and internal circumference, so as to form a channel between the rims, of about an inch and a half in depth, and of sufficient width to receive the edge of the cover intended to drop into it. The cover is constructed with a flanch, (D, No. 2 and No. 3), of the width of about two inches, running along its edge, to be adapted to and fall into the channel above described. A packing of sail-cloth or some similar compressible material, but somewhat thicker than heretofore described, must be laid in the channel, between the rims of the flanch which runs along the edge of the lower part, (in which case it is not necessary to fasten the packing,) or else be rivetted on to the flanch of the cover, or attached to it by some other convenient fastening. I myself lay the packing as above described, in the channel between the rims of the flanch, which runs along the lower part. Whether the packing be placed in such channel, or attached to the flanch of the cover, it should be moistened previous to use. The cover, (E, No. 2,) is furnished with a neck, (F, No. 2,) of such form, and dropping into such pipe, (G, No. 2,) and having connection, (H, No. 2,) with a condensing and exhausting apparatus as above described, or the neck may be altogether omitted in a vessel thus constructed; in which case the air may be exhausted, and the vapour formed during the evaporation may be carried off by means of a lateral pipe fixed in the lower part of the vessel (G, No. 3,) and communicating with an ordinary exhausting and condensing apparatus. But the latter mode of constructing, viz. with a lateral pipe, is not advisable when a steam-case is

applied to the close vessel, because the perforating of such case would be inconvenient. The mode of using the vessel thus constructed, is as follows : it may be supplied with juice or solution, brought in the open vessel to the desired temperature or consistency, as pointed out in the former part of this my specification, either by raising the cover and pouring the solution into the lower part of the vessel, and then dropping the cover upon the lower part of the vessel, or it may be supplied as in the vacuum-pan now in use, through a supply-vessel attached to the cover, and furnished with a valve, without raising the cover. The cover, when down, rests upon the channel described above ; the exhaustion of the air from within the cover is then commenced, and carried on by the action of the air-pump or other known means, and the two parts of the vessel becoming closely united by the atmospheric pressure, an air-tight junction is formed, and the exhaustion of the air and condensation of the vapour proceeding by means of the exhausting and condensing apparatus, a rapid evaporation takes place, till (as in the former instance) the requisite degree of concentration is attained. In case the junction does not appear perfectly tight, I find it serviceable to pour a small quantity of the juice or solution or any saccharine syrup, upon the edges of the channel before described, which may be done at any period of the operation, and without raising the cover. The juice or solution admitted into the close vessel of any or either of the forms above described, having thus been brought to the requisite degree of concentration, may be removed, and a fresh quantity, boiled in the open vessel to the desired temperature, may be admitted to be similarly dealt with, or the first quantity having so been brought to the requisite degree of concentration by evaporation in vacuo, one, two, three or more successive quantities may be admitted into the close vessel (without removing the first or former quantities,) and the whole, when brought to the requisite degree of concentration, be removed at the same

time, at the discretion of the operator ; but in general I find it better to pursue the method of admitting successive quantities, and removing the whole at the same time. Whichever of the two modes of constructing the close vessel be resorted to, the cover may be raised or lowered at pleasure, by means of a crane, (I., No. 1, 2, and 3,) screw, or other mechanical apparatus; and in either mode of construction, both the lower part of the vessel and the cover must be made of strength to resist the pressure of the atmosphere upon a vacuum. By either of these modes of constructing and using the close vessel, the process of concentration may be conveniently and satisfactorily carried on therein, and an air-tight junction is obtained, by which the cover and the lower part of the vessel may be securely and conveniently united, and which admits of being easily and conveniently separated, and of easy and convenient access being given to the whole inside of the said vessel and its contents. And I hereby declare that my invention for which the present patent is obtained, in so far as regards this second part of my improvement in the process of concentrating certain vegetable juices and saccharine solutions, does consist in substituting for the usual mode of fastening the cover of close vessels employed in the concentration of the juices and solutions comprehended in this patent by bolts and cement, or other fixed and permanent fastenings, an air-tight junction effected in the manner hereinbefore described. And although I have particularly described the period or stage of the process of concentration which I use, I nevertheless claim as part of my invention for which the present patent is obtained, the use of close vessels so constructed with air-tight junctions as aforesaid, in the process of concentrating the before mentioned juices or solutions, at whatever period or stage of such process the same be made use of. And although I have herein particularly described the manner in which a close vessel, having the cover and lower parts thereof united by such air-tight junction as aforesaid, may be conveniently used in the concentration of

such juices and solutions, by having a neck so contrived as aforesaid in the cover thereof, or such lateral pipe so placed as aforesaid in the lower part thereof, I nevertheless do not claim to have invented the use of a neck so contrived, or of a lateral pipe so placed in all case of close vessels used in the concentration of such juices and solutions, but only the adaptation thereof to such close vessels so used as aforesaid, as are united by such air-tight junctions. And though I have herein pointed out as subservient to the use of such air-tight junctions, means of raising and lowering the cover of such close vessel, and of admitting the air and the juices or solutions aforesaid into such close vessel, and of carrying off the vapour for condensation, and of supplying heat to such close vessel when it is judged advisable to do so, and of checking the escape of heat where it is not judged right to supply heat, I nevertheless declare that I do not claim to have invented such means or modes, but only to have applied and adapted them in subserviency to the use in the process of concentrating the juices and solutions aforesaid, of such close vessels as are united by such air-tight junctions.—In witness whereof, &c.

Enrolled September 8, 1838.

Specification of the Patent granted to LAURENCE ROWE, of Brentford, in the County of Middlesex, Soap-Maker, for Improvements in the Manufacture of the Sulphate of Soda.—Sealed April 16, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Laurence Rowe, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, and carried into effect, is par-

ticularly described and ascertained in and by the following statement thereof (that is to say) : —

My invention consists in a mode of applying water to the condensation of the muriatic and any other deleterious gases, produced in the manufacture of sulphate of soda, that can thus be acted upon, in their course through flues or passages from the decomposing furnaces to the chimney. My mode consists of a flue leading from the furnace to the chimney, over a channel through which the water which has been used in purifying falls, and passes away ; sufficient space being allowed for the free course of the gases in the flue above the water in the channel ; this flue at the end of a convenient distance ascends to the height of sixteen feet, or any other height adapted to the scale of the works, and thence descends through a series of alternately ascending and descending chambers, forming one continued flue, which in each successive chamber is alternately closed at the top or at the bottom, at the top by the junction of the brick or stone-work of which the flue may be built, with the roof of the flue, and at the bottom by the water in the channel, which is made to rise above a hole or arch through which it passes, but is baulked high enough to prevent the escape of the gases through the same holes. These ascending and descending chambers in the flue, are as numerous as the extent of the works may require ; those that I successfully used were four ascending and four descending chambers, the height of each sixteen feet, and the width of the chambers two feet, for the purification of the products of six furnaces, and decomposing thirteen tons of salt per week. The escape of the gases into the chimney can only take place after, in passing through these chambers, they have been exposed to my means of purification.

In order to purify the gases by separating and condensing those which are deleterious, in the course of their passage through these chambers, I place a vessel or tank of water over or above the top of the flue, with its bottom suffi-

ciently high above the top of the flue to give full effect by height to the pressure of the water, which is made to pass through pipes down to the bottom of the chambers, where their ends or nozzles are turned up, and whence the water issues in a jet or fountain, which by the pressure of the tank or head-water, which is kept constantly supplied, forces the jets to the top or nearly the top of the chambers ; in its ascent it breaks, and is greatly divided and falls back again through the current of gases which pass through the chambers of the flue. These pipes may be brought down either within or without the chambers ; if within, they should be of glazed earthenware or some material not readily acted upon by the acid gases. The size and form of the nozzle of the jet-pipe may be round, or any other that will the most effectually break and disperse the particles of water, yet reject it to the top of the chamber, thence it returns in a light shower, and falls or drips to the bottom, when it will have twice passed through the gases in the flue, and presented so large a surface of particles, as to cause the condensation of the deleterious gases, and bear them down to the channel at the bottom, where the water, having done its work of purification, flows off.

I have also invented and employed with success, the simple admission of water at the top, through a series of short pipes from the tank into the top of each chamber of the flue, and each being fitted to a stink-trap, to prevent the escape of the gas ; through these pipes the water descended into the chambers, and falling upon some oblique boards, keep them wet and dripping, and thus increased the wet surface for the purification of the gas ; but the advantage which I gain by the improvement which I have described, is that of the double action of the water up and down each chamber, thereby greatly increasing and facilitating the purification of the gases, at no greater cost than the purification by a single or descending course only.—In witness whereof, &c.

Enrolled October 16, 1839.

Specification of a Patent granted to JOHN JUCKES, of Shropshire, Gentleman, for Improvements in Steam-Engine Boilers, and in Apparatus for Feeding Furnaces and Fire-Places, and for the more Effectual Combustion of the Smoke and Gases arising therefrom.—Sealed November 8, 1838.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said John Jukes, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates, first, to improvements in steam-boilers and furnaces, whereby the fuel may be fed into the furnaces in such manner as to be acted upon by heat previously to coming on to the fire-bars of the furnaces; and,

Secondly, my invention relates to so modifying or arranging other furnaces and fire-places, that they may have like improvements of the modes of feeding fuel applied thereto. And I would here generally state, that the object of modifying steam-boilers and their furnaces, as well as in respect to other furnaces and fire-places, is to arrange the same, that the fire may heat suitable surfaces through which the fuel is forced, that there may be a previous heating of the fuel before it comes into the fire-place or grate, and it should be understood that whatever be the form in which my invention may appear, I make no claim to any modification or arrangement of boiler or furnace, or fire-place, or stove, unless it be combined with means according to my invention, of supplying fuel through tubes or surfaces heated by fire, into which the fuel is to be forced to supply the same.

Description of the Drawing.

Fig. 1, shews part of a section of a steam-engine boiler, arranged or modified according to my invention.

Fig. 2, shews another arrangement of boiler in section according to my invention. The boilers themselves do not materially differ from ordinary boilers, excepting inasmuch as they are modified to receive the other parts of the apparatus shewn in the drawing.

Fig. 3, shews another arrangement of boiler in section. In each of these figures the same letters indicate similar parts, and such parts are only varied in their construction in order to adapt them to the position in which they are placed, and are connected with suitable modifications of steam-boilers and of steam-boiler furnaces, as will readily be understood on examining these figures of the drawing. *a, a*, are the fire-bars of the fire-place of the furnaces. *b*, is a tube through which the fuel is fed to the furnaces. These tubes may be of any suitable material, but I prefer, that that portion or end which is acted on by the heat in the fire-place, should be of cast-iron or of fire-clay, in order to its lasting as long as possible. It will be seen that the end, *b*¹, of each of these tubes must necessarily become highly heated, and that the coal or fuel, in contact with such portions of heated surface, must have a distillatory process performed thereon, for it will be evident that the fuel will become highly heated before it receives any supply of atmospheric air, in order to support its combustion, which it will get so soon as it has passed the end of the tube, at *b*¹, and it is the capability of obtaining this result with suitably modified steam-boilers, and of steam-boiler furnaces, which constitutes my invention. The fuel in that portion of the tube or heated surface, *b, b*¹, will have much of its properties distilled off, which will pass into the fire-place amongst the highly heated fuel on the fire-bars, and be inflamed, and as the coked products

are forced into the fire-places of the furnaces, such coked material, or product of the fuel, will become the highly heated fire for acting on succeeding quantities of fuel. *c, c,* are hoppers, into which the fuel is placed, having openings into the tubes or ways. *b* and *d,* are rammers, by which fresh quantities of fuel are forced forward, which are clearly shewn in the drawing.

Fig. 4, shews a hot stove for heating apartments, constructed according to my invention.

Figs. 5 and 6, shews two arrangements of two open stoves or ranges. In each of these figures the same letters indicate similar parts as have been before described and shewn, such parts differing only inasmuch as they are rendered suitable for the peculiar construction of stove to which the same are applied ; but in fig. 6, the arrangement of apparatus for forcing up the fuel is somewhat different to the other arrangements. *f,* is an angular scoop, by which the fuel is forced up. The angular scoop, *f,* moving on an axis at *g* ; and there is a curved rack, by which the same can be moved by a pinion, *h,* having a suitable handle. In this case the fire-bars are so arranged in the centre as to be drawn back, when the fuel is being forced into the fire-place, as is clearly shewn in the drawing.

Having thus described the nature of my invention, I would remark that I lay no claim to any of the parts separately, which are shewn and described ; nor do I confine myself to the arrangements of steam-boilers or furnaces, or stoves, as shewn, so long as the same are arranged for having the fuel applied to the fire-places thereof, according to my invention, and as above stated. I make no claim to any of the modifications, when uncombined with such means of supplying fuel, but what I claim is,

First, the mode of arranging steam-boilers and furnaces in such manner as to have fuel fed to the fire-places

thereof through heated surfaces, which previously prepare or produce a distillatory process on the coal before it comes into the furnace, as above explained. And,

Secondly, I claim the mode of applying suitable means for heating the fuel of furnaces and stoves, in such manner that the fuel, in its progress to the fire-places thereof, shall be heated, or have a distillatory process performed thereon, as above described. And,

Lastly, I claim the mode of using of a sliding-bar or bars to fire-places, as shewn at fig. 6, when combined with feeding fuel from below, whether it be combined with a heated tube or way, *b*¹, or not. But I would have it understood that I do not claim the feeding of fuel from below, when uncombined with my improvements, or one of them.—In witness whereof, &c.

Enrolled May 8, 1839.

Specification of the Patent granted to HERBERT READ WILLIAMS, of the City of Gloucester, Surgeon, for Improvements in Trusses and Surgical Bandages.—
Sealed February 21, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Herbert Read Williams, do hereby declare the nature of my invention and the manner in which the same is to be performed are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

Description of the Drawings, Plate 1.

Fig. 1, is a front view of a truss, with centre regulation.
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ing plate, loops, and swivels. *a, a*, is the pad-plate made of thin metal, slightly arched on its upper side and its edge turned down about one eighth of an inch, to receive the pad. *b, b*, is the centre regulating-plate. *c, c*, are the metal loops moving on swivels or centres, *d, d*, which are either rivetted or joined by screws to regulating-plate. This regulating-plate is fastened on the square head of the projection, which I call the plinth, *f*, rivetted or otherwise affixed on top of pad-plate, and secured by the screw, *e*. *g*, is a loop detached. *o, o*, is a metal loop attached to the end of perineum strap which slides on top of the stud, *e*, and by which the pad is held in its place, the other end of this strap is passed round the thigh and buttoned, or otherwise attached to the belt on either side of the hip, at *p, p*.

Fig. 2, is the regulating-plate with the loops, *c, c*, and portions of the belt, *k, k, k*. *i*, is an octagonal opening in the centre of regulating-plate, *b*, by which the position of the pad is adapted to any required inclination on the square head of the plinth, and is fastened on the head of the plinth, *f*, by the screw, *e*. *k, k, k*, are parts of the belt which is made of any desired width and formed of padded leather or other material, and is passed round the body about the hips, and fastened by means of the tongue, *m*, inserted through the loop, *l*, and secured on the studs, *n, n*.

Figs. 3 and 4, are side views of the pad with springs. *a*, is the pad-plate. *b*, the pad. *c, c, c, c*, are single and double elliptical springs acting on the upper surface of the pad, and effecting a more uniform pressure. *d, d*, shew the position of the plinth on the head of which the regulating-plate and belt is secured by a screw as in figs. 1 and 2.

Figs. 5, 6 and 7, are three other modes of attaching the belt to the regulating-plate, and admitting of the same motion as the loops, fig. 1, *c, c*.

Fig. 8, is a drawing of a military prophylactic belt

(drawn one third size) convertible into a double or single truss. *a, a, a*, are portions of the belt with regulating-plate, loops, and swivels (as before described fig. 2) and are attached by a plinth and screw to the pad *b, b*. *c, c*, are the prophylactic plates, both of which are tightly padded and lined with silk or other material, and are secured to the belt, *a, a*, by the screws, *e, e*, and are designed to support the parts on either groin over the herniary openings. The belt passes round the body (as before described) and fastened through the loop, *f*. This apparatus, fig. 8, is convertible into a single or double truss by inserting a truss-pad, with or without springs, under the plates, *c, c*, and securing them by a screw as in fig. 1, *e*. Note. The truss-pad I prefer to be composed of successive layers of cloth or padding, laid one on the other, to the desired thickness, and cut to the required form and size, covered with soft leather, silk, or other material, and is attached to the inner side of the pad-plate by screws or other means. And also note; that the belt, pad, springs, and other apparatus as above described, are to be modified in size or arrangement so as to meet the peculiar position and requirements of the case, are adapted for application to any form of hernia, and also for surgical bandages intended to retain weak or distorted joints, fractured bones, for effecting pressure on arteries or for correcting deformity.

Description of Plate 2.

Fig. 1, is a front view of a truss-pad, shewing another mode of effecting the required inclination, vertical, oblique, or horizontal. *a, a, a, a, a*, are five holes pierced through the pad-plate, *b, b*, into either of which the stem of the screw, *c*, is inserted, after securing the loop, *d*, by passing through the end of the lever, *e, e*. This lever moves on the centre stud, *f*, and the belt is attached by its plate and loops (as in plate 1, figs. 1 and 2).

Fig. 2, is a front view of the abdominal shield. *a, a*, are two thin springs curved inwards to the proper form of the abdomen and rivetted to the surface of the shield, *b, b*; this shield is padded lightly inside and lined with silk, or other soft material. *c, c*, is an arched spring (as seen edgewise at fig. 3) secured across the shield by the studs, *d, d*, the regulating-piece and belt are attached by the plinth, *e, e*, (as described in plate 1, fig. 2). This apparatus may be adapted for a single or double truss, by inserting a pad under either or both the points, *f, f*, and may be worn without the usual thigh strap.

Fig. 4, is a front view of the gentleman's hunting belt. This belt passes over the abdomen round each hip to the back and the ends of strap, *a, a*, being inserted through the loops or rings, *b, b*, placed on the back pad, *c, c*, (as shewn at fig. 7,) are returned forward and fastened by the buckles, *d, d*. *e, e*, are two thin springs stitched within the substance of the belt and curved inwards to the form of the abdomen and pressing closely on herniary passages. If required as a truss, pads are placed under, *f, f*, and secured by screws or otherwise.

Fig. 5, is a modification for a double or single truss: the belt after passing round the body and through the loops or rings on the back pad is brought forward, and buckled on the pad, *a*, across the abdomen. *b, b*, are the pad-screws and studs for perineum straps. *c, c*, are moveable rings through which the strap, *d*, passes and regulates the distance of the pads from each other.

Fig. 6, suspensary belt for ladies. *a, a*, are two light springs quilted securely into the thickness of the belt and curved inward to effect a gentle pressure and support. *b, b*, the two ends of the belt which pass behind through the rings of the back pad, and are returned forward and laced to each side, *c, c*, so as to accommodate itself to the varying circumference of the form.

Fig. 7, is a view of the back pad with its loops or

rings on centres, and shewing the manner of passing the ends of each belt through the said loops or rings, and forwards round the body.

Plate 3.

Fig. 1, is a front view of the utero abdominal shield. *a, a*, are two springs fastened on the shield and curved inward to the required form, the shield is suitably padded on its inner side and covered with silk or other suitable material. *c, c, c*, is an elliptical spring and plinth by which to equalize the pressure on the abdomen, and on which the centre-piece loops and tongues, *d, d, d*, are secured by the plinth-screw, *e*. *f, f*, are the two ends of a belt which goes round the body. *g, g*, are buckles which receive the tongues, *d, d*, and fasten the shield in its place. *h*, is the perineum spring, made of plated metal, carrying on its extremity the pad, *i*. This spring after being adjusted to its required length and position is secured by the screw, *k*. *l*, is a hinge, by which the lower part of the perineum spring is at any time drawn forward or turned aside, and again secured firmly in its place by means of the flat turning nut, *m*, passing through a slit in the spring.

Fig. 2, is a side view of the perineum spring, *h*, shewing its curvature forwards over the pubes and inwards towards the perineum with its regulating holes, hinge, *l*, pad, *i*, and mode of shifting, at *m*.

Fig. 3, is a view of the back pad with double perineum strap to be used (if preferred) in lieu of the spring, fig. 2. *m*, the back pad. *n, n*, two rings on centres, through which the ends of the belt is passed, and then carried forward and fastened to the shield (as in fig. 1). *o, o*, is a double strap, the length of which is regulated by the buckles, *p, p*, on the back pad. These straps are carried downward and forwards, along the perineum and crossing over at the point where the pad, *q*, is required to be placed, they button in the front of the shield on the studs

(*r*, *r*, fig. 1) *s*, is a small pad made to slide on the perineum straps behind, for the purpose of keeping them apart. The perineum pad is of caoutchouc suitably formed. This apparatus is also applicable to prolapses ani, either by an extension of the perineum spring, or by altering the position of the pad on the straps backward to the rectum.

Having thus described the mechanical structure and combination of the parts, I will explain some of the characteristics of the invention by which the object and extent of the invention will readily be ascertained. And, first, of the trusses in plate 1, the belt of which is passed round the person about the hips, and effects the requisite pressure on the truss-pad, by the agency of certain loops or rings moving on centres, and attached to the said pad by a plinth, and the requisite pressure (if desired) is further assisted and rendered equable by the use of an elliptical spring extended over the length of the pad-plate and interposed between it and the mechanism of the belt (but this spring at no point touches the body). This peculiar mode of attaching the belt to the pad allows the belt to assume the proper inclination downwards, towards the lower margin of the pelvis, accommodating itself to the respiratory undulations of the abdomen, while it yields to the varied motions of the body without the smallest liability to displace the pad, and thus the patient is relieved from all anxiety respecting its retaining its correct position.

And, secondly, this truss combines an unequalled accuracy of position of the pad with a power of being regulated by means of the regulating-plate to any requisite or desirable inclination, either vertical, oblique, or horizontal, as may be most conducive to the comfort of the patient or the circumstances of the case.

The prophylactic belt is an elegant instrument, peculiarly adapted for the use of those, who from constitutional debility or other causes, are pre-disposed to hernia.

To members of the army and sportsmen, this belt will prove very valuable, as from its compact form it is imperceptible while on the person, and may be readily put on or off; while, from the peculiar mechanism of the belt, it freely accommodates itself to the requisite position for effecting pressure over either groin, and efficiently sustains the parts liable to injury.

The umbelical shield. This shield and its apparatus are intended to support the abdominal viscera, when from a relaxation of tone in the hypogastrick muscles, they bear down into the pelvis, and thereby greatly tend to induce herniary protrusion, and which, where the disease is already developed, exasperates the symptoms and protracts the cure. This shield is made to accommodate itself to the outline of the abdomen by means of two springs secured to its upper surface, and curved inwards, and which springs, should hernia already exist or supervene, are adapted to make the requisite pressure on a pad inserted under their lower extremity, and thus this instrument combines the properties of an umbelical supporter with those of an efficient truss.

The hunting belt possesses similar advantages to the umbelical shield, and is also convertible into a truss, it is intended to meet the wishes of such, who may prefer this particular form of bandage. The two flat elastic springs are stitched within the materials of the belt and curved over the abdomen, the two extremities of the belt are carried round the hips to the back, on which is placed a small light pad over the os sacrum; on this pad are two rings or metal loops moving on centres, through these are passed the said ends of the belt which are returned forwards and buckled in front.

The ladies belt is especially adapted for that comfort and support which is so desirable and necessary in the delicate circumstances of pregnancy or after accouchment. This belt is studiously contrived to accomplish the requisite support in the proper direction gently upwards and

inwards, not only by a peculiar form in the belt itself over the abdominal surface, but also by the use of a strengthening pad placed on the back, to which is attached two metal rings made to move on centres, which, while they yield to the free motion of the body, gives to the belt the required inclination forwards and downwards, and by this means the broad part of the belt retains its position, and sustains efficiently and comfortably the lower part of the abdomen. This unique belt fits so compactly on the person as not to interfere with the stays, and need not be removed at night. It will be seen from the foregoing descriptions of the various trusses and bandages, an important improvement will be found in the mode of affixing the pads, owing to the employment of adjusting plates, as herein shewn and described, whereby the pad, which is oblong, can be set and securely affixed in any required position in respect to the straps or bandages, and by the means of attaching the straps or belts to the adjusting-plates, any requisite movement of the parts will be obtained to accommodate the pads to the person when respiring or moving. And, further, in respect to other of the trusses and bandages, the modes of combining the parts of the pads and shields, and the means of connecting them with proper bandages or straps will be found very advantageous. And I would have it understood, that I lay no claim to any of the parts of trusses or bandages, which are well known and in use, such as the pads and the belts or bandages when separately considered. But what I claim, are the modes of constructing and applying the various parts of the apparatus to the pads, and also the means by which the straps or bandages are connected thereto. And I also claim the modes of arranging the different constructions of shields shewn in various figures of the drawing and the means of attaching the straps or bandages thereto.—In witness whereof, &c.

Enrolled August 21, 1839.

Specification of the Patent granted to THEODORE COTELLE, of the Haymarket, in the County of Middlesex, Civil Engineer, for Improvements in Extracting the Salt from Sea and other Water, and in rendering it pure and drinkable, and in Purifying other Water.
—Sealed December 1, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Theodore Cotelle, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention consists in extracting the salt, and other impure matters from sea-water, by means of an apparatus hereafter described; and also in improving the quality of such and other impure waters, by filtering them, in a mode hereafter described.

I will first describe the mode of separating the salt from the water: I construct an apparatus consisting of three vessels, which I call the boiler, the rectifier, and the condenser. The salt water is placed into the first, and subject to the action of the fire, the water, as steam, passes into the rectifier, through a series of bent tubes, placed, as shewn in the drawing, at fig. 2, and into which the steam enters as it passes from the boiler, and from thence it passes into the condenser; any steam that may remain in the rectifier when the process is stopped, is drawn off at the cock, *c*¹¹, when it becomes condensed into water, depositing in its passage through the rectifier, any impurity that may remain in the water after it comes from the boiler. This condensed water is then in a fit state for cooking purposes, but I improve the quality of it, and

render it drinkable, by using my mode of filtering, which may be used in combination with my evaporating apparatus, or it may be used alone as an ordinary filter for improving any impure waters. This filter may be constructed of any suitable material, but I prefer that it should be made of wood; I prefer oak, from its being more durable. The upper part is closed by a cover, which is hermetically sealed, to prevent the admission of any impure matters; any suitable filtering material may be used, that being no part of my invention; the water is poured into the upper part of the filter, through a hopper, on to a wooden plate, perforated with small holes, into which are placed pegs or pins, of a size not quite so large as the holes, the object of which is to prevent the water passing into this filter at too rapid a rate, and at the same time to clarify it by preventing the passage of any impurity that may yet remain in the water; the water percolates through the filtering material, and is drawn off at the bottom, as shewn in the drawing; and in its passage through the filter, the air acts upon it by means of a series of tubes, which are placed within, and project from the filter, and through which the air passes, which so operates upon the water, as to improve its quality, and render it fit for all purposes, and give it that pure and sparkling appearance which belongs to spring water. The number of these tubes may be arranged according to the quantity of air required. The form of these tubes is shewn in the drawing, in dotted lines. I would remark that, although I have shewn my apparatus by itself, it will be evident that it may be readily attached to any description of stoves, and it will be found to be particularly applicable to be attached to the cooking-stoves of merchants' vessels, and to the ships of her Majesty's navy.

Description of the Drawings.

Fig. 1 represents an end view of my apparatus for

separating the salt from the sea-water, in combination with the filter, used according to my invention.

Fig. 2, shews a side view of the apparatus; and,

Fig. 3, a plan of the same. The same letters indicate the same parts wherever they occur. *A*, is the boiler, into which the salt water is placed. *a*, is the door of the fire-place. *a*¹, is the ash-pit. *a*¹¹, is the damper, to regulate the supply of air to the fire. *a*¹¹¹, shews the flue for the passage of the smoke to the chimney. *B*, shews the cock to draw off the water from the boiler. *c*, represents the rectifier, which is attached to the boiler. *c*¹, the cover of the rectifier, of a form similar to a still-head, leading into the condenser. *c*¹¹, cock, to draw off the water that may remain in the rectifier after each operation. *c*¹¹¹, shews the point of junction between the boiler and the rectifier. *D*, represents the condenser, which consists of a coil of pipe, winding round the interior, and which is immersed in cold water; the steam in its passage through this pipe is condensed, and is drawn off at the bottom at the cock, *d*. *T*, shews the shaft leading to the chimney.

Description of the filter. A section of which is shewn attached to the apparatus. *E*, is the filter. The figure 1, represents the hopper, through which the water runs into the filter. 2, is the perforated plate, placed on the top of the filtering materials. 3, are the pegs or pins placed in these perforated holes. 4, shews the bent tubes placed in the sides of the filter, to admit the air to pass into and among the filtering materials. *d*, shews the cock to draw off the water when filtered.

I am aware that the salt has been before separated from the sea-water by evaporation; I am also aware that it is not new to purify water by passing it through filtering materials. I do not, therefore, claim either of these processes, except when performed according to my invention herein described; but what I claim as my invention is, the mode herein described, of extracting the salt from sea-water; and,

Secondly, the mode of improving such and other impure water, by causing currents of air to pass into and among the filtering material, during the passage of the water through the filter, as above described.—In witness whereof, &c.

Enrolled June 1, 1839.

Specification of the Patent granted to WILLIAM ARTHUR, of Glasgow, North Britain, Machine Maker, for Improvement in Spinning Hemp, Flax, and other Fibrous Substances.—Sealed November 4, 1837.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said William Arthur, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention consists of a mode of combining certain mechanical instruments, into a machine for spinning hemp, flax, and other fibrous substances, more particularly for the purpose of producing of yarns for strands, for the making of cords, ropes, and cables. And in order that my invention may be most fully understood, I will proceed to describe the drawings hereunto annexed.

Description of the Drawings.

- Fig. 1, is a front view ; and,
Fig. 2, is a transverse section of a machine, combined according to my invention. In each of these figures the same letters indicate similar parts ; and such is the case in respect to fig. 3, which shews a section.

Fig. 4, which is a plan of the fixed chaps, *l*; and, Fig. 5, which is a front view of some of the working parts shewn on an enlarged scale, in order that their construction and mode of working, may be more readily traced. *a, a*, is the framing of the machine. *b*, the main or driving-shaft, on which are affixed the pulleys for giving motion to the cans or apparatus containing the sliver of flax, hemp, or other fibrous substance, suitable for the purpose. The shaft, *b*, receives motion from a steam-engine, or other first mover, by means of a strap acting on the drum or pulley, *c*, which is affixed on the shaft, *b*; and *d*, is a loose drum or pulley, on to which the driving-band or strap is to be moved when it is desired to stop the machine, as is well understood by machinists. *e*, is a drum affixed on the shaft, *b*, and by means of the endless strap, *f*, motion is communicated to the drum or pulley, *g*, which is affixed on the shaft, *b*. The shafts, *b*, and *h*, turning in suitable bearings at each end of the machine, as is clearly shewn. On the shaft, *h*, are affixed a series of pulleys, *i, i*, which, by means of gut or other suitable bands, drive the hollow spindles, *j, j*; they having suitable pulleys for that purpose, as is clearly shewn in the drawing. The hollow spindles, *j, j*, each consist of the tube, *j*, which turns in the bearings, *k*, the nature of which is shewn in the various figures, and its shape will readily be ascertained by an examination of the drawing, particularly at the enlarged views of these parts. At the upper end are hinged two nippers or chaps, *j¹, j¹*, which are caused to press together by means of two springs, *j², j²*, and the two surfaces of the chaps or nippers which come together have grooves which have not parallel sides, but are trumpet-shaped or bell-mouthed, in such manner that the sliver will be held at the upper part. The object of these nippers or chaps to the hollow spindles, *j*, is that the sliver shall be tightly held at that point, and sufficiently so as to cause the spindle in its revolution to put on twist to the sliver, as it passes or is drawn beyond the

point of holding. *l*, is another pair of chaps or holders of the yarn or thread as it is produced, and the necessary twist is put on between the nippers or chaps, *j*¹, *j*²; and the chaps, *l*, as the thread or yarn moves or is drawn between those two points, and the speed at which the yarn or thread is drawn from the point, *j*¹, to the point, *l*, and the number of revolutions the hollow spindles make in that time, will determine the degree of hardness of the spinning, or the number of turns put on to a given length of yarn or thread, which may be varied at pleasure; at the same time the machine will at all times retain the property of making very solid and equal yarns or threads, and much cheaper than can be performed by hand, and the threads or strands produced will be much stronger; hence the cords, ropes, or cable made of such yarns or strands will be more uniform. The nippers or chaps, *l*, consist of the moveable chap, *l*, which moves on a fulcrum, *l*¹, and has a lever weighted to cause it to press against the fixed nippers or chap, *l*², and on the pressing surfaces of these nippers or chaps, *l*, *l*², there are small parallel grooves. It will be seen that the yarn or thread is drawn from the chaps, *l*, by means of draw-rollers or pulleys, *o*, *p*, *q*, from whence it passes to be wound on to a reel or bobbin or otherwise, according to the purpose to which it is to be applied. The pulleys, *o*, *p*, *q*, are affixed on shafts or axes, *o*¹, *p*¹, *q*¹; and they receive motion by a train of wheels, *r*, and this train of wheels receives motion from the shaft, *b*, by means of the strap, *s*, driving the drum or pulley, *s*¹, which moves on the axis, *s*²; the drum or pulley, *s*¹, having the pinion, *t*, which may be changed to produce varied quantities of twist in a given length affixed to it, drives the wheel, *v*, affixed on the shaft, *o*¹, all which is clearly shewn in the drawing. On the shaft, *b*, are affixed the pulleys, *w*, *w*, which by means of straps or bands, drive the pulleys on the frames which carry the cans, *x*. These cans, *x*, are to be filled with sliver of considerable length, by means of any of the

known machines for making slivers in continued lengths; which forms no part of my invention and is well known; but the cans being filled are placed in the frames, y , each frame consisting of the circular disc, y^1 , and its spindle or axis below, and the upper disc, y^2 , which has a mouth-piece or opening for the passage of the sliver, and the two discs, y^1 , y^2 , are combined together by the three bars, y^3 , the bar, y^3 , being so arranged and constructed that it may with facility be removed, and admit of the empty can being removed, and a filled one replaced, as is clearly shewn in the drawings. The frames, y , are caused to move in the same direction as the hollow spindles or revolving-tube, with a view to keep the twist off that part of the sliver, which is below the holding-point of the revolving nippers or chaps, j^1 , and I prefer that the cans should slightly overrun the spindles, though this is not absolutely necessary; the drawings shew the relative sizes of the parts. It will be seen that the hollow spindles, j , and the mouth of the frames, y , are at some distance apart; the object of this is that the attendant of the machine, may see the sliver as it comes up, and prevent it going double should it so come up; this arrangement is desirable where the sliver is found to catch, otherwise the frames, y , and spindles, may be combined together.

Having thus described the nature of my invention, and the manner of combining the various parts, I would remark that I do not claim any of the parts separately; nor do I confine myself to the precise arrangement or combination shewn, provided the general character and mode of working be retained; and it will only be desirable further to add that what I claim is the mode of combining the various parts of the machine shewn and described, whereby continuous slivers (from a can or such like holder) are spun by means of revolving apparatus, having sufficient holding of the fibres to put on the twist, and whereby the twist is kept off from the loose sliver till the proper time, and whereby the required quantity of twist is put on by

regulating the speed at which the yarn or thread is drawn off, in respect to the number of revolutions of the twisting apparatus as above described.—In witness whereof, &c.

Enrolled May 4, 1838.

Specification of the Patent granted to CHARLES HANCOCK, of Grosvenor Place, Hyde Park, in the County of Middlesex, Animal Painter, for Certain Improved Means of Producing Figured Surfaces, sunk and in relief, and of Printing therefrom, and also of Moulding, Stamping, and Embossing.—Sealed January 25, 1838.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Charles Hancock, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are particularly described and ascertained in and by the following description thereof (that is to say):—

First. I take a block-cylinder or other piece of metal, and I roughen the surface whereon the design is to be made by any of the means in common use, so as to obtain that peculiar tooth, denominated by engravers mezzotinto ground, and after transferring the outline of the subject thereon, by the usual means, I proceed to scrape, etch, or otherwise remove the superfluous parts of the surface, so as to obtain the required forms and variations of light and shade. I then cut deeply with the graver all those parts which I desire to appear as high lights. The plate being now in a complete state for printing from, I take a sheet of India-rubber from a quarter to half an inch thick, and cut it to the shape and size of the plate. I, then, with fluid India-rubber, cement the edges of the sheet to a piece of stout canvass or cloth, of size enough to leave a margin round the sheet, adequate to the strain,

and fix this piece of canvass or cloth firmly in the tympan frame of a common printing press (dispensing wholly with the blanket usually employed). To prevent the paper or other material on which the impressions are to be taken from sticking to the India-rubber sheet or substitute for the blanket, I interpose a single sheet of very thin paper between them. The printing being then proceeded with, the impressions will be found to exhibit the reverse effects to those of ordinary printing from mezzotinto plates, the usual light parts appearing in mine as darks, and the usual darks appearing as lights, while the general effect is much heightened by the deep incisions of the graver, and by the nice adaptability of the India-rubber substitute for the ordinary blanket to all the varieties of the engraved surface from which the impressions are taken. I do not, however, confine this process to what is technically called mezzotinto ground, for it is equally applicable to all other grounds possessing a similar roughness, whether granular or hatched, or by whatever means produced; any varieties of tint required are obtained by the usual modes denominated by engravers stopping out and biting in, but the effects produced are the reverse of those resulting from the usual modes of aquatinto engraving and printing, namely, instead of biting in deeply those parts which are intended to be dark, I stop them out, and instead of stopping out those parts which are intended to be light, I bite them in deeply or cut them out with a graver.

Second. When it is desired to produce certain parts of a subject in high or bold relief, and such parts form but a small portion of the whole plate, it is the usual practice of engravers to sink or cut away the remaining or large portion of the plate, a mode of proceeding which absorbs much time, and is attended with considerable labour; instead of this, I cut out separate pieces of metal of the shape of those parts of the subject which are designed to be in bold relief, and affix them in their

proper places to the principal plate by some suitable solder or cement. A simple illustration of this plan of superposition may be given by supposing it to be desired to print the playing card, denominated "the ace of diamonds." I stamp or cut out or cast a piece of metal of the figure of the ace, and affix it in its proper place to the principal plate by some suitable solder or cement. The parts thus stuck on may afterwards be etched or engraved according to the views of the artist.

Third. I take a copper or steel plate prepared with an ordinary etching ground, and over this ground, I lay a piece of woven silk or wire-gauze, or glass paper, or any other fabric of such a texture as will by pressure break up uniformly the whole surface of the etching ground into minute projecting particles resembling the aquatinta ground. To the ground so obtained, I transfer my design in the usual way, and proceed to etch, engrave, stop out, and otherwise treat the same, as before described upon grounds so obtained. I likewise draw my design with lithographic chalk, or paint, with oil colour, or sealing wax dissolved in spirits of wine, and afterwards etch in the other parts of the ground. And I thus obtain by a combination of drawing, painting, and engraving in relief, a figured surface in relief, from which impressions may be taken by a common printing press.

Fourth. I take a thin solution of caoutchouc (or India-rubber) mixed with etching ground, diluted to a suitable consistence, or any other composition, which will resist the action of acids, and with it cover the whole surface of the plate, and then with an etching point or other suitable instrument, remove all the parts which are not intended to be in relief, or with the same or any suitable composition draw or paint upon plain curved or undulated metallic surfaces, the whole or that part of my design which I intend to be in relief, and when the drawing is perfectly dry, I place it in a dish or trough of adequate dimensions, with its face downwards, immersed to a pro-

per and uniform depth in the acid liquor, which I allow to operate until the desired effect is obtained. Should any part require to be placed in higher relief, the plate-block or cylinder, is to be washed clean with spirits of turpentine, and a ground laid on in the manner usually practised in relaying of grounds; it is then to be submitted again to the action of the acid or the part lowered with the graver. And in working up my design, I avail myself of any of the modes of practice adopted in line engraving or etching. In some cases I lay a ground over the whole surface in the same manner as for line engraving; then take red-lead-cake, water-colour, or other composition that will protect the ground, diluted with water to a proper consistence for painting, and with ordinary instruments, draw or paint in the design. When this is dry, I wash off the original ground between the lines of the design, with spirits of turpentine or linseed oil; and when dry, lower the ground by acid, affording such assistance as may be required by the graver.

Fifth. I practice in some cases, the following mode of obtaining relief: I cover the entire surface of the plate or cylinder, with a composition of white lead and plaster-of-Paris, mixed with water, or with a mixture of vermillion, soap, and gum, sufficiently diluted, or with any similar composition that will mix with water. If the composition does not lay, the metal should be washed over with rosin, dissolved in spirits of wine. I then with an etching needle or point, draw in the subject through the composition down to the surface of the metal. All the parts of the composition that are too broad for the point, I scrap away with any convenient tool; the incisions and spaces so made, I then fill up by means of wax or etching ground diluted, or other composition insoluble by acid; and when the whole has become hard, I either submit the plate or cylinder at once to the action of acid, or I first wash away with water the composition of which the design was made, and afterwards apply the acid and

finish with the graver, or other suitable instruments. If stereotype or other soft compositions of metal is used, I employ tools for removing the ground made of hard wood, bone, or horn. And in some cases I use metals plated with gold, and after the first biting in, I sometimes gild the plate or cylinder by the ordinary methods of plating or gilding metals. In this case I relay a ground by varnishing the interstices as well as the surface, and then re-enter the bottom of the line only. I use aqua-regia or intromuratic, for biting away the gold from the bottom of the lime. If all the varnish be then cleaned off with spirits of turpentine, re-biting with the usual acids will give considerable depth without the necessity of more relaying of etching ground.

Sixth. For obtaining a very bold relief, I prefer the employment of lithographic stones, or stones of a similar description; and when I employ them, I use the same materials for drawing or painting in the design, and for obtaining the relief as I have before described under the fourth and fifth heads of this specification, and after the same manner, excepting only that the acid I use for this purpose is the nitre diluted. But as lithographic stones are convenient from their great thickness and weight, and are liable to be broken in the press, I take sunk impressions from them in plaster, and then casts in relief from the plaster moulds in stereotype metal, and by the usual stereotype process. The spaces between the lines I then deepen to the degree required by cutting with a graver. This mode of obtaining figured surfaces in relief, I find to be peculiarly applicable to vignette subjects, as all the open and very deep parts may be stopped out and deepened by the addition thereby, of more plaster laid on with a brush upon the high part of the plaster-mould.

Seventh. I draw or paint upon metallic surfaces, with such materials, as water-cake colours, treacle and glue, &c., that diluted acids will operate upon, and when the design

is completed, I brush over the whole surface of plate with a resinous varnish, or with wax which diluted acids will not act upon. I then plunge the plate into hot water, to soften and loosen the treacle, &c., and afterwards apply the diluted acid in the ordinary way, which removes the design and acts upon the copper underneath it, producing thereby the required relief in those parts which are coated with the rosin or wax. This process, although peculiarly applicable to the printing of silks, cotton, and paper-hangings, may be advantageously employed in works of fine art, as the ordinary modes of engraving may be combined with it on the same surface.

Eighth. I produce figured surfaces sunk, and in relief, upon thin plates of silver, copper, zinc, brass, or other ductile metal in the following manner. Both surfaces of the plate being rendered smooth, I indent with a hard point or other suitable instrument, the required designs upon the same, or impress the design by means of a die-stamp or figured roller. The design is of course sunken on the one surface, while on the other, it appears in relief. The plates thus prepared are then fixed to blocks or frames, with either surface upwards, and prints taken from them.

Ninth. For the purpose of printing upon glass, porcelain, china, earthenware, and other substances, I produce figured surfaces, both sunk and in relief, upon blocks or stamps made of flexible substances, such as India-rubber, or the composition of glue and treacle used in making printers' balls and rollers, that is to say: I take casts or impressions in such flexible substances from metal plates or wooden blocks, on which the design to be transferred has been previously engraved or from castings in metal or plaster of any figured surface or surfaces (a form of printing type for example). I take the India-rubber, either in its original fluid state, or artificially dissolved to a proper consistence, and pour or spread it over the engraved plate, block-die, or stamp in successive layers

(allowing one layer to dry before I put on the next), until I obtain the required thickness, upon removal of these elastic blocks or stamps, they will be found to have taken up facsimile impressions of their original dies or matrices, but in reverse. To transfer the design from these elastic blocks or stamps to a surface of glass or glazed porcelain, I charge the figured parts of the block or stamp with a resinous varnish, and then apply with a slight pressure to the glass or glazed porcelain. The parts of the glass or porcelain in which the block or stamp leaves no impression, are left unprotected. I then etch in by means of fluoric-acid, and thus produce on the glass or porcelain a copy in relief of the original design. In embossing on engraving stone in relief from such flexible stamps, I proceed in the same manner as for glass, excepting that I use diluted nitric acid, instead of the fluoric. To give the flexible stamps greater firmness, I sometimes mix the India-rubber, while in the fluid state, with whiting, plaster, or other substance, in a state of powder, that will easily combine therewith. But in making my flexible stamps of the composition of glue and treacle, as before mentioned, I melt those substances in the ordinary proportions used by printers, in a glue pot, and cast the stamps of their entire thickness at once upon the dies or matrices. These stamps will readily take up the ink or colouring matter which it is desired to print with, and by very slight pressure on the article, that is to receive the design completely, transfer it thereon.

Tenth. To obtain figured surfaces from lace, net, gauze, wire-gauze, hair-cloth, and various other figured fabrics, and print from the same, by the following process, which I find particularly applicable to the printing and ornamenting of gloves and other fancy articles. I take the lace or net or other figured fabric, and lay it down stretched over a plane surface or round a cylinder, preferring a sheet of India-rubber to lay it upon, (in

which case I fix it to the India-rubber by any suitable cement;) I then charge the lace with colour, in the same manner as type is charged, and take impressions from it by the common modes or process of printing from surfaces in relief. In the case first supposed, the coloured parts may be said to represent the lace, but the process may be reversed so that the lace shall appear to be white or without colour, while the interstices between the threads which form the net-work, are coloured. For this purpose I distend the lace or other fabric over the surface of a plate, block, or cylinder, covered with India-rubber, and by means of another plate, block, or cylinder, (made of similar elastic materials) charged with colouring matter, I deliver the colouring matter through the interstices of the lace or other fabric, on to the substance or fabric to be printed, (which is conducted between the two cylinders,) the interposition of the threads of the lace preventing any colour from getting underneath those lines or figures, which constitute the pattern of the lace or other figured fabric.

Eleventh. For the purpose of printing in a variety of colours, I adopt the following method; the subject or design is first transferred in outline to as many pieces of cambric, paper, cloth, or leather, as they are different colours to be printed. All those parts of each of these outline impressions, which are not desired to be of one and the same colour, are then stopped out with sealing-wax dissolved in spirits of wine, or any other suitable composition. I then take as many pieces of cambric, wash-leather, or other material which will absorb and deliver colouring-matters readily, as there are different colours to be printed, and saturate each with one particular colour. To obtain single impressions in the different colours, I then proceed as follows: I take a blank piece of paper, cloth, or other material fit for printing on, and place upon it one of those outline impressions before mentioned, in which all the parts not meant to be of one

colour are stopped out, taking care to keep the varnished side uppermost ; I then lay upon this partially varnished surface, a piece of cloth or other material saturated as before, directed with the particular colour intended to be given to the unprotected parts of the design, and by applying pressure to the back of this saturated piece, the colour is forced through the unvarnished parts, and delivered upon the parts of the blank piece of paper or cloth at the bottom. I go through the same process with each of the remaining outline impressions, till the whole of the subject or design has been transferred to the blank piece of cloth or other material, in the desired diversity of colours ; the pressure may be applied in any convenient way. When I make use of a press I find the India-rubber blanket before described, or a cylinder covered with India-rubber, peculiarly applicable. The process of printing in colours which I have last described, will be found especially suitable to paper-hangings, calicoes, and other fabrics, upon which large masses of colour are required to be delivered. In some cases where great delicacy of tint is required, I charge the plates with colour, in the same manner that ordinary copper-plate engravings are, that is I fill in the unvarnished parts of the surface, and wipe away the superfluous colour from the surrounding parts, or instead of using the wash-leather or other saturated substance, the plates may be charged with colour at the back of the cambric or other fabric, with a brush, sponge, or other means. I sometimes make my colouring surfaces upon the following plan : after producing the outline of the parts intended to carry colour, I sink them or the surrounding parts below the surface, by the modes before specified, of graving, stopping out, and biting in ; I then fill the sunken, or put upon the raised, parts, leather, or any othersuitable material that will absorb or receive colouring-matter, and fix it by cementing it to the sunk or relief surface with diluted asphaltum or other suitable cement ; I charge these leather surfaces with colour in the usual way,

or by the modes above specified, and print from them by the usual methods of surface-printing. And having now fully described my said invented improvements, I declare that in all the processes hereinbefore specified, there are parts which in themselves and separately regarded are not new, and to which therefore I lay separately no claim. But that each and every one of these processes is in consequence of its embodying some new combination of methods, previously known, or some original combination of methods, partly old and partly new, so new in the aggregate as to produce effects which are either not to be obtained from any process heretofore known, and in general use, nor to be obtained with equal facility and cheapness. And what I therefore claim as of my invention in each case, is the improved means by which the said new and useful effects are produced; and such my invention being to the best of my knowledge and belief entirely new, and never before used within that part of Her Majesty's United Kingdom of Great Britain and Ireland, called England; Her said dominion of Wales or Town of Berwick-upon-Tweed, or in any of her said Majesty's Colonies and Plantations abroad, I do hereby declare this to be my specification of the same, and that I do verily believe this, my said specification, doth comply in all respects fully and without reserve or disguise with the proviso in the said hereinbefore in part recited letters patent contained; wherefore I do hereby claim to maintain exclusive right and privilege to my said invention.—
In witness whereof, &c.

Enrolled July 25, 1838.

Specification of the Patent granted to MATTHEW UZIELLI, of King William Street, in the City of London, Merchant, for Improvements in the Modes of Impregnating Wood or Timber with Chemical Materials.—Sealed September 4, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Matthew Uzielli, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof (that is to say) :—

The improvements in impregnating wood or timber are performed by calling into play a natural power which will be found to exist in trees recently felled, and which causes the introduction into all parts of their substance any liquid in which their lower extremities are immersed a few inches. The most favourable time to proceed to this preparation, is when the circulation of the sap is most active, and when trees are most covered with leaves. Experience has proved that the circulation has sufficient energy to produce the most satisfactory results during the months of May, June, July, August, and September, in certain species of trees it continues in October and November ; pine and fir belong to the latter. Preservative liquids, and others can be applied in whatever position the tree is placed, by steeping its foot in a vessel containing the liquor it is desired to impregnate the timber with. But as a great expence of manual labour can be avoided by preparing the trees when lying down, their preparation ought to be proceeded with, by adapting (as soon as possible after they are hewed down) to their lower extremity an apparatus in the shape of a bag, made of waterproof cloth answering as a reservoir, which is constantly kept full of the liquid to be absorbed. The

greater the number of limbs and of leaves left upon the tree, and the sooner the operation takes place after it is cut down, the surer and more complete the penetration will be, yet the possibility of introducing the liquid to a considerable extent has been ascertained, even after several days had elapsed since the tree was felled and had been deprived of its limbs. It is important that this circumstance should be known, for in many instances it may serve to avoid operating on the spot, and permit the establishment of central depots for the preparation. The time required for the operation seldom exceeds ten days, its duration depends on the vigour of the tree, on its species, on its age, and on the season of the year. Of all the matters which have been introduced into timber by the mode pointed out above, those which deserve the preference for its preservation are the unrefined pyrolignites (acetates) of iron and copper. All their elements, among which is creosote are already known as good preservatives, and their cost, particularly that of the first named, is very trifling. Though a decided preference is given to these salts, great reliance can be placed in others; amongst them chloride of sodium (common salt) and arsenious acid (white arsenic) are to be particularly noticed; pieces of timber prepared with these substances have been submitted to powerful causes of alteration, and it has already been possible to ascertain that their protecting effect is very remarkable. To lessen the inflammability and particularly the combustibility of timber, it is to be impregnated with chloride sodium (common salt), or with what is still better a concentrated dissolution of chloride calcium (muriatic lime), shewing twelve degrees by Baume's areometer. The peculiar quality of rendering timber impermeable to moisture, is obtained by the introduction of rosins dissolved, either in spirits of turpentine or in alcohol or pyroxylic spirits (wood-spirit, wood-naptha), the same dissolvents permit the introduction of camphor and all essential oils.

Finally. Valuable colours can be given to white wood by penetrating it with sulphate of indigo, a solution of pernambuco woods. The warping of wood has always been prevented by the introduction of chloride of sodium (common salt) or of chloride calcium (muriate lime). I would remark that I do not confine myself to any particular solutions for impregnating timber or wood; the invention secured by the present letters patent, not depending on the materials it is desired to impregnate the timber or wood with, but to the mode of applying wood or timber in such manner as to take advantage of the natural circulation, thus rendering the employment of very large tanks unnecessary, as only the lower ends of trees or timber is required to be immersed in the liquor.—In witness whereof, &c.

Enrolled January 4, 1840.

Specification of a Patent granted to THOMAS BURR, of Shrewsbury, in the County of Shropshire Lead Merchant, for Improvements in Rolling Lead and other Soft Metals.—Sealed August 8, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Thomas Burr, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof (that is to say):—

My invention relates to a mode of rolling lead and other soft metals, by applying rollers heated with steam, hot water, or hot air. And in order to give the best description in my power, I will proceed to describe the rollers used by me, which are suitably arranged for employing steam as the heating means, which is the mode I prefer, and I will afterwards give such other explanations

as will enable a workman to construct rollers suitable for employing hot water, and for employing hot air. In making rollers where steam is to be employed, I drill or otherwise form a hole through the centre of the rolls from one end to the other, about three quarters of an inch diameter. I insert into each of the said holes one end of a steam-pipe of copper, or other metal of about half an inch in diameter, reaching about two thirds of the length of the rolls, having apertures in the sides thereof, so as to heat the rolls regularly. The other end of the pipe communicates with a steam-boiler, such pipes being packed steam tight at its entrance into the hollow rollers; and in order to convey off the water of condensation from the rolls, I attach to the other end of them a waste pipe by means of a swivel-joint similar to those used in gas fittings, fire-engine hose, and other articles, and which are well known by engineers. I would remark that I do not confine myself to the holes through the rollers being three quarters of an inch diameter, though that is the size of holes I employ. It should be stated that the steam I use is ten pounds on the square inch in the boiler. When it is desired to use hot water, I apply similar pipes to those above explained, connecting them to a suitable boiler in such manner as to produce a constant flow of hot water through them, which proceeds through the flow-pipes, thence through the rollers and thence by the return pipes to the boiler, in like manner to apparatus usually employed and well understood by engineers for circulating hot water for heating houses and other places, taking care, as in the case of the using of steam, that the entrance or flow-pipes as well as the outlet or return pipes are suitably connected with the hollow rollers to preserve them water-tight; all which however is well known to engineers in heating rollers for other purposes.

When it is desired to use hot air, I employ similar hollow rollers, and by means of any suitable blowing

apparatus I blow air through iron or other pipes externally exposed to fire and connected to one end of each of the hollow rollers, and by this means cause a constant stream of heated air to pass through the rollers, and it should be stated that the smaller the diameter of such pipes, and the greater the length thereof exposed to the fire, the greater will be the heat. But as before stated, I prefer to employ steam as the heating means. And I would have it understood that I do not confine myself to the precise means of apparatus described for applying the heating matter employed, whether steam, hot water, or hot air.

Having thus described the nature of my invention, I would have it understood that what I claim is the mode of rolling lead and other soft metals by the application of rollers heated by steam, hot water, or hot air.—In witness whereof, &c.

Enrolled February 8, 1840.

Specification of the Patent granted to MOSES POOLE, of the Patent Office, Lincoln's Inn Fields, in the County of Middlesex, Gentleman, for Improvements in the Manufacture of Soap, by the Application of Materials not hitherto used for that purpose.—Sealed June 4, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Moses Pool, do hereby declare the nature of my said invention and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof (that is to the say) :—

The invention relates to the application of a product of fish obtained by means of digesting fish as early as possible after they are taken, without other preparation, in a Papiu or such like digester. And in order to give the

best information in my power, I will proceed to explain more fully the means pursued in order to perform the invention. But I would first remark, that I am aware that it is not new to employ fish or parts of fish in the making of soap, by submitting them with alkali to certain processes, but which having nothing to do with this invention no description is required in this specification, and I have only mentioned the circumstance in order to disclaim all right and title to the employment of fish or parts thereof, in the making of soap when applied under other circumstances than according to this my specification. The apparatus and process of digesting bones in Papin's or such like digesters being well known, it will not require description here, and as a like process is to be performed on fish, by preference, in the state they are taken and as soon after as convenient; little description will be required, the invention not relating to the process but to the application of the product in the making of soap. It may be desirable to state, that any description of fish may be used which can obtained in large quantities, and at a cost which will allow of this application of the product obtained therefrom. And I may state that herrings and sprats are particularly applicable for the purpose. The fish are to be placed in the digester or boiler in the state they are taken, and by means of the digesting process with steam are to be wholly reduced to a jelly, which by preference should be immediately converted into soap either by itself or combined with fatty matters at present employed; but it is better to combine such product with equal weight of tallow or other suitable fatty material for making soap, the product of fish being gradually incorporated with the tallow or fatty material in the boiler, and such product of fish alone or combined with other fatty matters are to be converted into soap by alkali, or by any of the ordinary means now practised in making soap from tallow or other fatty matters. The digesting process is performed with steam at 50 to 70lbs.

on the square inch, the fish being covered with water at the commencement, and the process takes about five to seven hours.

Having thus described the nature of the invention, I would have it understood that what I claim is the mode of making soap by the application of a product of fish obtained by digesting as above described.—In witness whereof, &c.

Enrolled December 4, 1840.

ALTERATIONS AND DISCLAIMERS IN SPECIFICATIONS.

*In the matter of a Patent granted to RICHARD EDWARDS, of Dewsbury, in the County of York, Leather and Flock Seller, for an Improvement on a Substitute for Glass, Sand, Emery, and other Scouring Paper or Substances.—Sealed December 6, 1830.**

Disclaimer and Memorandum of alteration, entered by WILLIAM JAMES BARSHAM, late of Bow, in the county of Middlesex, but now of Stratford, in the county of Essex, Manufacturer, Assignee of the said patent, pursuant to the act.

I, the said William James Barsham, do hereby declare that since the date of the said deed of assignment, I have been advised that it is doubtful whether the wording of the said specification is such as clearly to limit the claim of invention to the application of glass, sand, or emery, to woven fabrics pulped, or whether it extends to woven fabrics generally, which was not intended. And for this reason, I, the said William James Barshan, do hereby disclaim and alter as follows: that is to say, after the words "*my invention consists in applying glass, sand, or emery, to the surface of calico, linen, or other woven fabric,*" I hereby make the following alteration, that is

* For a description of this invention, see Repertory, vol. xii. p. 285.

to say, I add the words "*which has been pulped.*" And a little further on in the said specification, after the words "*woven fabrics,*" I hereby make the following alteration, that is to say, I add the words "*which has been pulped.*" And after the word "*and,*" next following, I hereby disclaim the words "*laid smoothly over a board or other surface, and with paper pulp or thick paste I fill up the interstices of such fabric by spreading the pulp or paste evenly over the fabric. The cloth or fabric so prepared is then to be dried after which.*" And a few lines further on in the said specification, after the words "*the cloth is,*" I hereby disclaim the word "*again.*" And further on, in the claiming clause of the said specification, I hereby make the following alteration, that is to say, after the words "*by means of cement to,*" I hereby add the word "*pulped.*"—In witness whereof, &c.

LAW REPORTS OF PATENT CASES.

Vice Chancellor's Court, January 17, 1840.

PARKIN *v.* HARRISON, and Others.

IN this case Mr. Knight Bruce, applied to His Honour the Vice Chancellor for an injunction to restrain the defendants, their servants, or agents, from paving Whitehall, or any other road or way for carriages, with blocks of wood formed with the grain inclined to the horizon and dowelled together as described and claimed in the specification of letters patent granted to the plaintiff, Thomas Parkin, on the 9th day of April, 1839. In support of the application, it was solemnly declared by the plaintiff that after many experiments and great expense, he invented "improvements in railroad and other carriages, and in wheels for such carriages, and in roads and ways on which they are to travel," amongst which improvements were several improved modes of forming and

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laying wooden blocks for pavements, which he described in his specification, as follows: "my improvements in roads and ways consist according to this, my first mode of paving them with blocks of wood, having the grain inclined to the horizon in some angle varying from about 45 degrees to about 70 degrees, the grain of all the blocks leaning in the same direction or towards the same points of the compass. And according to my second mode of paving with similar blocks, as in my first mode, but the alternate rows of blocks leaning towards the opposite point of the compass, each pair of leaning blocks being sometimes held together by a dowell, passing through the middle of both blocks." That immediately after this declarant's patent was granted, he publicly advertized and exhibited his invention.

That on the 27th of June last, a patent was granted to Richard Hodgson, of Salisbury Street, in the Strand, for an invention communicated to him from abroad, by the Count de Lisle, which invention does not differ in any material respect from the invention patented by the plaintiff on the aforesaid 9th day of April.

That on or about the beginning of July, the defendants and others purchased the said Richard Hodgson's patent, and advertized proposals for forming a company called the "Metropolitan Patent Wood Paving Company," to carry on the alleged invention of the Count de Lisle. That shortly before the date of such advertisement, the plaintiff had entered into an agreement with a Mr. Hunt Grubbe, for the sale to him of so much of his patent as relates to wood paving, upon the following terms: 100% to be paid down, 100% more on the 15th of July, and 100% more in three months, on condition of parties being found by Mr. Hunt Grubbe, within that period, to furnish capital, to carry out the invention; and in the event of either of these conditions not being complied with, then the agreement be considered null and void. That on the 13th of July, the said Hunt Grubbe, informed him

that he had assigned the said agreement to Richard Hodgson. That on the 15th of July, Mr. Hodgson called on plaintiff and gave him to understand that he had purchased the agreement of Mr. Hunt Grubbe, on behalf of the company, and on paying the 100*l.* due on that day, stated that he had no doubt the company would pay the 100*l.* on the 28th of September, as provided by the agreement. It further appeared by this declaration, that Mr. Hodgson, declined to pay the sum of 100*l.* on the 28th of September, and stated that the company would neither purchase the patent, nor take a licence to use the pavement, because it would amount to an admission that the patent granted to him, the said Richard Hodgson, was void; but that the company were willing to employ the plaintiff to superintend their business, and pay him a handsome salary. The declaration also stated several propositions for an arrangement between the plaintiff and Hodgson, on behalf of the company, which however were not carried into effect, and the company having proceeded to have a part of the road opposite Whitehall paved; the plaintiff was compelled, in support of his patent right, to make this application.

John Isaac Hawkins, Civil Engineer, in his affidavit states, that he was applied to in the month of August, by certain parties to negotiate with plaintiff for the purchase of his patent, so far as respects wood pavement; but that plaintiff, not being able to get any final answer from the said Mr. Hodgson, until after the 28th of September, the negotiation went off, and has not since been renewed; and in the opinion of deponent the plaintiff thereby lost the opportunity of disposing of his patent to good advantage.

Affidavits for Defendants.

William Carpmael, Civil Engineer, saith, that he was consulted by the plaintiff previous to his applying for his patent, to advise as to the proper title, for which purpose

the plaintiff delivered to him a paper containing the particulars of his invention, that immediately on preparing the title of plaintiff's patent, he returned the said paper writing, but that he has a perfect recollection of the contents of the said paper, and that the invention there described, did not in any manner, resemble the invention patented by Mr. Hodgson, (a model of which was produced to Mr. Solicitor General, at the time of his application for the patent,) or the wood pavement now laid down at Whitehall, or the models or shapes described by the figs. 23 and 24, contained in the drawings referred to by the said plaintiff in the specification of his patent.

Affidavit of Richard Hodgson, and Augustus Counte de Lisle.

Augustus Counte de Lisle, saith, he is a native of, and domiciled in, France. That in the month of May last, he came to this country and communicated an invention of his own to Mr. Richard Hodgson, and who, on his behalf, applied for letters patent for the same, and which were granted on the 27th of June last. That the application for the patent was opposed by two persons, but that no opposition was entered by the plaintiff or by any other person on his behalf. That after the sealing of the patent no secret was made of the invention, but that it was freely communicated to all persons taking an interest therein, and in particular as to the 9th of July, the deponent exhibited and explained his invention to His Royal Highness the Duke of Sussex and a numerous auditory.

Richard Hodgson, saith, that the Reverend Mr. Hunt Grubbe, was present at such public explanation, and informed deponent that plaintiff had obtained a patent for an invention in some respects resembling that of the deponents; and that he had purchased so much of that patent as related to wood paving. And deponent not being aware of the merits or nature of said plaintiff's alleged invention, and having no means of judging whether

in truth it did or did not resemble deponent's invention, and perceiving that the agreement was conditional, and being apprehensive that the said Hunt Grubbe and plaintiff might get up an opposition to the company for carrying into effect the principle of deponent's invention, which he was then forming and which was known by the said Hunt Grubbe, he deponent agreed to purchase the right of the said Hunt Grubbe, in the plaintiff's patent. That the deponent did not give the plaintiff to understand that he procured the assignment of the said portion of the plaintiff's patent as the solicitor, and on behalf of the persons calling themselves the "Metropolitan Patent Paving Company," neither did he say that he deponent had no doubt the company would pay the 1000*l.* on the 28th of September, as provided in the agreement, and being advised that the payment of the 1000*l.* might be considered prejudicial to his patent he declined to make such payment and suffered the agreement to become void. Both deponents say, that the wooden pavement laid down at Whitehall, is in accordance with the principle of the said invention of the said Richard Hodgson as described in his specification, and that the inclination of the blocks of wood of which the said pavement is composed is not of about 45 degrees as stated in plaintiff's said bill, but such inclination is of the precise angle of 63 degrees, twenty-six minutes, five seconds, and eight tenths, being the only angle claimed in the said last named specification, and that on which the principle of the invention depends; and that the appositively leaning blocks are not such blocks, nor are the same fastened, as are mentioned by the plaintiff in his first and second modes of paving with wood as described in his specification; but that the same are held and fastened together by pegs, each peg being placed in the centre of the two isosceles triangles, which each lateral side surface of each block presents, and which said triangles are produced by each block being cut at the precise angle aforesaid; and that

by such means each block gives the same support which it receives from the other block, and enabling the whole mass of blocks when fastened as aforesaid to present a compact surface of any extent.

Mr. Jacob, on behalf of the defendant, contended that the plaintiff was not the inventor of the mode of wood paving claimed in his specification, but that the invention had evidently come to his knowledge by the publicity given by the Count de Lisle, of their invention, discovered by him long before the plaintiff's patent was applied for, and therefore prayed his honour to refuse the injunction.

The Vice-Chancellor.—In this case the question will be first of all, whether the plaintiff has a valid patent, and next, whether the defendants have infringed the patent. Well, now with respect to the plaintiff's patent, I must observe that in the first place, it never appears to have been acted on, there is no instance alleged in which it has ever been said, that there has been any dealing on it whatever, except that strange course of treaty on the subject, which arose out of the agreement between the plaintiff and *Mr. Grubbe*. Well, that having been the only dealing on it, it is impossible to say that any validity is to be attributed to the patent on account of its length, for the patent, I think, was dated the 9th of April, and the specification was filed on the 9th of October, and there has been a treaty about it, and that is all, and consequently therefore I think the court is not bound to say that the length of time is such as of itself *prima facie* establishes the legal right of the patentee. Now I cannot but myself think therefore, that the court is at liberty to look into the specification and see whether it is *prima facie*, reasonably clear that the specification is good, and when I look at the specification, I am sure I am not willing to give any final judgment on it, because it is not my province so to do, but I cannot but, myself, have considerable doubt whether this specification is a suf-

ficiently good specification as to this matter. "And, 7thly, My improvements in roads and ways, consist according to my first mode in paving them with blocks of wood having the grain inclined to the horizon in some angle, varying from about 45 degrees to about 70 degrees, the grain of all the blocks bearing in the same direction or towards the same point of the compass." Well, now it is observable that where a party is speaking about angles, he is speaking of a matter of quantity, about which it is extremely easy to speak with accuracy, and I cannot but myself think, that according to the language that is here used, it is really and fairly a doubtful matter, that is to say legally doubtful, whether that thing which might have been expressed with sufficient accuracy, has been expressed with sufficient accuracy, or whether it is possible to make out exactly what it was that the party did mean. Now strictly speaking, the words as they stand do only imply, that it was to be at some angle not 45 or 70 degrees. I am quite sure the party did not mean that, and therefore, I have a case before me in which the words of the specification the party uses language, of which all that can be said is, that with reasonable certainty it does not express the parties meaning. Well, then, in the latter part where he speaks of what he had before spoken of, having regard to my 7th head of improvement of roads and ways, I say that the first and second mode is the paving with blocks of wood, having the grain inclined to the horizon from about 45 degrees to about 70 degrees, and I claim the dowelling of the blocks together in paving when slanting or leaning in opposite directions; and then he speaks about the rails, and so on. Now, I cannot but myself think here, that the party has meant to have it understood that the dowelling itself is a part of the invention, and, therefore, *prima facie*, I should have thought it rather contrary to one's common experience to have it, in the year 1839, claimed as an invention, that certain blocks of wood were to be fastened together by

means of dowering, and I doubt whether that is any invention at all. Now I cannot but myself think, that on such a patent as this, before the court does any thing so as to interfere against the defendants, that the court ought to take some method to have it established, that the plaintiff has got that legal right which the plaintiff pretends to have. But then, with respect to the second part of the case, supposing that the plaintiff's patent is good, is it so clear that what the defendants' have done is a violation of the patent? I do not mind the mode in which that affidavit is made, on which Mr. Knight Bruce has laid so much stress, namely, the speaking by Mr. Hodgson, and the Count DeLisle, in the way they do about the invention; what they say is, "They verily believe that the invention for which the above named plaintiff took out the letters patent in the bill mentioned, did not and does not in any respect correspond to, or resemble, the invention of this deponent, Richard Hodgson, communicated to him by the other deponent, Augustus De Lisle;" and they say "that the plaintiff hath improperly laid claim to the said last named invention, and hath endeavoured to include the same or such part thereof as relates to wood-pavement in the specification of his said patent." Now I cannot but think that the fair inference of that affidavit is, that they mean to say, that the patent in fact and truth is for an invention different from the defendants' invention, but that the plaintiff wishes to have it thought that his specification is for the same invention, that is what I understand the plaintiff to say, and therefore by no means to admit, as Mr. Knight Bruce presses on me that they do admit by the affidavit that these two inventions are the same.

Now with respect to the defendant's invention, as I understand it from his specification, it is a precise and definite thing, and is an invention by means of cutting a cube in a certain manner, which is detailed in the specification itself, and it appears to me that where the defen-

dant does point out a particular mode of cutting the solid body,—the cube, in such a manner as that, invariably and of necessity, there must be figures precisely of the same shape produced, always having certain given angles upon the planes of the sides, and, therefore, always producing, when laid transversely one across the other, that certain isosceles triangle of which he speaks, which enables him exactly to determine and place the same in all, however numerous, in which they can be introduced; the hole and the pin which will have the effect of uniting several blocks with each other, in the manner that is easily shewn by those instruments. I cannot but think, that he *prima facie*, at least, has invented a definite thing which does materially differ from that very vague and indefinite thing, which the plaintiff has described in his specification. Now, I think myself, therefore, that, before I interfere by injunction, what I ought to do is to direct the plaintiff to bring such action as he may be advised; in that action he will have in the first place to make out that his patent is a good and legal patent, that is the first fact he will have to make out, and then he will have to make out that by the act which the defendant actually has done that the patent, if good, has been infringed, and both those points can be determined, simply by directing that the plaintiff shall bring an action. It is not necessary to give any special directions as to admissions, but it does appear to me that the case stands in such a shape, that it will be too much to infer from these very singular affidavits, which contain a series of conduct of a most extraordinary kind, with respect to the agreement and the treaty on it; it does appear to me to be too much to infer from those affidavits that there has been a clear admission on the part of the defendants, that what the defendants are doing is the same thing as what the plaintiff has taken out a patent for, or to infer that the defendants have admitted their patent to be only for that thing for which the plaintiff has taken out his patent, or to infer that the

defendants have at all conceded any point; which if I do correctly understand their affidavits, they were determined from the beginning to defend as manfully as by law; they might, and perhaps by other means if necessary. And it does appear to me, therefore, that in this case the proper order to be made is to direct the plaintiff to bring such action as he may be advised, and to direct the motion to stand over, with liberty for both parties to apply.

NOTICE OF EXPIRED PATENTS.

(Continued from p. 121.)

JAMES GUESTIER, of Fenchurch Buildings, London, Esquire, for a mode or modes of making paper from certain substances, which are thereby applicable to that purpose. Communicated by a foreigner residing abroad.—Sealed November 17, 1825.

ALEXANDER LAMB, of Princes' Street, London, Gentleman, and **WILLIAM SUTTILL**, of Old Brompton, Middlesex, Flax Spinner, for improvements in machinery for preparing, drawing, roving, and spinning flax, hemp, and waste silk.—Sealed November 17, 1825.

GEORGE BORRADAILE, of Barge Yard, Bucklersbury, London, Merchant and Furrier, for an improved method of making or setting up of hats or hat bodies. Communicated by a foreigner residing abroad.—Sealed November 17, 1825.

AUGUSTUS COUNT DE LA GARDE, of St. James's Square, Middlesex, for improved machinery for breaking or preparing hemp, flax, and other fibrous materials. Communicated by a foreigner residing abroad.—Sealed November 24, 1825.

JOSEPH EVE, of Augusta Georgia, America, now residing at Liverpool, Engineer, for an improved steam-engine.—Sealed November 24, 1825 —(*For account of specification, see Repertory, Vol. 3, third series, p. 70.*)

HENRY KING, of Norfolk Street, Commercial Road, Middlesex, Master Mariner, and **WILLIAM KINGSTON**, of the Dock Yard, Portsmouth, Master Millwright, for improved fids for topmasts, gallant masts, bowsprits, and all other masts and spars to which the use of the fid is applied.—Sealed November 26, 1825.

RICHARD JONES TOMLINSON, of Bristol, Gentleman, for framework for bedsteads and other purposes.—Sealed November 26, 1825.

MARC LARIVIERE, of Princes' Square, Kennington, Surrey, Mechanist, for certain apparatus or machinery to be applied to the well-

known Stamp's fly-presses, or other presses, for the purpose of perforating metal plates, and for the application of such perforated metal plates to various useful purposes.—Sealed November 28, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 182.*)

WILLIAM POPE, of Ball Alley, Lombard Street, London, Mathematician, for improvements on wheeled carriages.—Sealed December 3, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 180.*)

THE SAME, for improvements in making, mixing, compounding, improving, or altering the article of soap.—Sealed December 3, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 300.*)

HENRY BERRY, of Abchurch Lane, London, Merchant, for an improved method, in different shapes or forms, of securing volatile or other fluids, and concrete or other substances, in various descriptions of bottles and vessels.—Sealed December 3, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 301.*)

EZEKIEL EDMONDS, of Bradford, Wilts, Clothier, for improvements on machines for scribbling and carding sheeps' wool, cotton, or any fibrous articles requiring such process.—Sealed December 3, 1825.

JOHN BEEVER, of Manchester, Gentleman, for an improved gun-barrel.—Sealed December 3, 1825.

EDMUND LUSCOMBE, of East Stonehouse, Devon, Merchant, for a method of manufacturing or preparing an oil or oils extracted from certain vegetable substances, and the application thereof to gas-light and other purposes. Partly communicated by a foreigner residing abroad.—Sealed December 6, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 252.*)

JOHN PHILLIPS BEAVAN, of Clifford Street, Middlesex, Gentleman, for a cement for building, and other purposes. Communicated by a foreigner residing abroad.—Sealed December 7, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 311.*)

FRANCIS HALLIDAY, of Ham, Surrey, Esquire, for improvements in machinery to be operated upon by steam.—Sealed December 9, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 296.*)

JOSEPH CHEESEBOROUGH DYER, of Manchester, Patent Card Manufacturer, for improvements in machinery for making wire-cards for carding wool, cotton, tow, and other fibrous substances of the like nature; and also certain improvements on a machine for shaving and preparing leather used in making such cards.—Sealed December 9, 1825.

ROBERT ADDAMS, of Theresa Terrace, Hammersmith, Middlesex,

Gentleman, for a method of propelling or moving carriages of various descriptions on turnpike, rail, or other roads.—Sealed December 14, 1825.

MATTHEW FERRIES, of Longford, Middlesex, Calico Printer, for improvements on presses or machinery for printing cotton and other fabrics.—Sealed December 14, 1825.

JAMES ASHWELL TABOR, of Jewin Street, Cripplegate, London, Gentleman, for means for indicating the depth of water in ships and vessels.—Sealed December 14, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 317.*)

JOHN M'CURDY, of Cecil Street, Strand, London, Esquire, for improvements in generating steam.—Sealed December 27, 1825.—(*For account of specification, see Repertory, Vol. 3, third series, p. 307.*)

JAMES OGSTON and JAMES THOMAS BELL, of Davies Street, Berkeley Square, London, Watch Makers, for improvements in the construction or manufacture of watches of different descriptions. Communicated by a foreigner residing abroad.—Sealed January 6, 1826.

(*To be continued.*)

LIST OF NEW PATENTS.

MOSES POOLE, of Lincoln's Inn, Gentleman, for improvements in pumps for raising and forcing water and other fluids.—Communicated by a foreigner residing abroad.—Sealed January 30, 1840.—(*Six months.*)

WILLIAM BROCKEDON, of Queen's Square, Middlesex, Esquire, for improvements in the means of retaining fluids in bottles, decanters, and other vessels.—Sealed January 31, 1840.—(*Six months.*)

PHILIPPE MARIE MOINDRON, of Bedford Place, Russell Square, Merchant, for improvements in the construction of furnaces and in boilers. Communicated by a foreigner residing abroad.—Sealed January 31, 1840.—(*Six months.*)

WILLIAM CUBITT, of Gray's Inn Road, Builder, for an improvement or improvements in roofing.—Sealed January 31, 1840.—(*Six months.*)

CROFTON WILLIAM MOAT, of Thistle Grove, Brompton, Esquire, for a new and improved method of applying

steam-power to carriages on ordinary roads.—Sealed February 5, 1840.—(*Six months.*)

WILKINSON STEELE and **PATRICK SANDERSON STEELE**, Manufacturing Ironmongers, of George Street, Edinburgh, for improvements in kitchen ranges for culinary purposes, and apparatus for raising the temperature of water for baths and other uses.—Sealed February 5, 1840. (*Six months.*)

WILLIAM ISAAC COOKSON, of Newcastle-upon-Tyne, Esquire, for certain improved processes or operations for obtaining copper and other metals from metallic ores.—Sealed February 5, 1840.—(*Six months.*)

THOMAS MYERSCOUGH, of Little Bolton, and **WILLIAM SYKES**, of Manchester, Machine Maker, for certain improvements in the construction of looms for weaving or producing a new or improved manufacture of fabrics, and also in the arrangement of machinery to produce other descriptions of woven goods or fabrics.—Sealed February 5, 1840.—(*Six months.*)

SAMUEL CARSON, of Caroline Street, Coleshill, Eaton Square, Gentleman, for improvements in apparatus for withdrawing air or vapours.—Sealed February 5, 1840.—(*Six months.*)

JOSEPH NEEDHAM TAYLER, of Plymouth, Captain in the Royal Navy, for improvements in steam-boats and vessels, making applicable the power of the steam-engine to new and useful purposes of navigation.—Sealed February 8, 1840.—(*Six months.*)

JOHN WERTHEIMER, of West Street, Finsbury Circus, Printer, for certain improvements in preserving animal and vegetable substances and liquids. Communicated by a foreigner residing abroad.—Sealed February 8, 1840.—(*Six months.*)

ROBERT BEART, of Godmanchester, Miller, for improvements in apparatus for filtering fluids.—Sealed February 8, 1840.—(*Six months.*)

AMAND DEPLANGUE, of Lisle, in the Kingdom of

France, but now residing in Leicester Square, Gentleman, for improvements in looms for weaving. Communicated by a foreigner residing abroad.—Sealed February 8, 1840.—(*Six months.*)

EDMUND RUDGE, Jun., of Tewkesbury, Tanner, for a new method or methods of obtaining power for locomotive and other purposes, and of applying the same.—Sealed February 8, 1840.—(*Six months.*)

JAMES HANCOCK, of Gloucester Place, Walworth, for a method of forming a fabric or fabrics applicable to various uses, by combining caoutchouc or certain compounds thereof, with wood, whalebone, or other fibrous materials, vegetable or animal, manufactured or prepared for that purpose, or with metallic substances manufactured or prepared.—Sealed February 8, 1840.—(*Six months.*)

GEORGE EUGENE MAGNUS, of Manchester, Merchant, for certain improvements in manufacturing, polishing, and finishing slate, and in the application of the same to domestic and other useful purposes.—Sealed February 8, 1840.—(*Six months.*)

ROBERT WILLIS, of the University of Cambridge, Clerk, Tonksonian Professor, for improvements in apparatus for weighing.—Sealed February 8, 1840.—(*Six months.*)

DAVID NAPIER, of York Road, Lambeth, Engineer, for improvements in the manufacture of projectiles—Sealed February 12, 1840.—(*Six months.*)

ANTOINE BLANC, of Paris, Merchant, and THEOPHILE GERVAIS BAZILLE, of Rouen, Merchant, now residing at Salbonieres Hotel, Leicester Square, for certain improvements in the manufacturing or producing soda, and other articles obtained by or from the decomposition of common salt or chloride of sodium.—Sealed February 12, 1840.—(*Six months.*)

THOMAS ROBINSON WILLIAMS, of Cheapside, Gentleman, for certain improvements in the manufacture of

woollen and other fabric or fabrics of which wool or fur form a principal component part, and in the machinery employed for effecting that object.—Sealed February 14, 1840.—(*Six months.*)

JOSEPH CLARKE, of Boston, Printer, for improvements in piano-fortes.—Sealed February 14, 1840.—(*Six months.*)

GERARD RALSTON, of Tokenhouse Yard, Merchant, for improvements in rolling puddle balls or other masses of iron. Communicated by a foreigner residing abroad.—Sealed February 22, 1840.—(*Six months.*)

RICHARD CUERTON, JUN., of Percy Street, Middlesex, Brass Founder, for improvements in the manufacture of cornices, mouldings, and window sashes. Communicated by a foreigner residing abroad.—Sealed February 22, 1840.—(*Six months.*)

THOMAS KERR, of Forecrofts Dunse, in the county of Berwick, Esquire, for a new and improved mortar or cement for building, also for mouldings, castings, statuary, tiles, pottery, imitation of soft and hard rocks, and other useful purposes, and which mortar or cement is applicable as a manure for promoting vegetation and destroying noxious insects. — Sealed February 22, 1840. — (*Six months.*)

WILLIAM COOK, of King Street, Regent Street, Coach Maker, for improvements in carriages.—Sealed February 22, 1840.—(*Six months.*)

JOHN HANSON, of Huddersfield, Engineer, for certain improvements in meters for measuring volumes of gas, water, and other fluids when passed through them, and in the construction of cocks or valves applicable to such purposes.—Sealed February 22, 1840.—(*Six months.*)

WILLIAM WINSOR, of Rathbone Place, Middlesex, Artists' Colourman, for a certain method or certain methods of preserving and using colours.—Sealed February 22, 1840.—(*Six months.*)

JOSEPH CUTLER, of Lady Poole Lane, Sparkbrook; Bir-

mingham, Gentleman, and THOMAS GREGORY HANCOCK, of Highgate, in the same Borough, Mechanist, for an improved method of cutting corks and constructing the necks of bottles.—Sealed February 22, 1840. — (*Six months.*)

WILLIAM BRINDLEY, of Northwood Street, Birmingham, for improvements in apparatus employed in pressing cotton, wool, and goods of various descriptions.—Sealed February 25, 1840.—(*Six months.*)

THOMAS HUCKVALE, of Over Norton, Oxford, Farmer, for improvements in ploughs.—Sealed February 25, 1840. — (*Six months.*)

THOMAS FARMER, of Gunnersbury House, near Acton, Middlesex, Esquire, for improvements in treating pyrites to obtain sulphur, sulphurous acid, and other products.—Sealed February 25, 1840.—(*Six months.*)

JOHN WILSON, of Liverpool, Lecturer on Chemistry, for an improvement or improvements in the process or processes of manufacturing the carbonate of soda.—Sealed February 25, 1840.—(*Six months.*)

RICHARD KINGDON, of Gothic House, Stockwell, Surrey, Surgeon, for certain improvements in apparatus for the support of the human body, and the correction of curvatures and other distortions of the spine of the human body. — Sealed February 25, 1840. — (*Six months.*)

THOMAS MILNER, of Liverpool, Safety Box Manufacturer, for certain improvements in safes, boxes, or other depositories for the protection of papers or other materials from fire.—Sealed February 26, 1840. — (*Six months.*)

WILLIAM MORRETT WILLIAMS, of Bedford Place, Commercial Road, Middlesex, late of the Royal Military College, and Professor of Mathematics, for an improved lock and key.—Sealed February 27, 1840.—(*Six months.*)

THE
REPERTORY
OF
PATENT INVENTIONS.

No. LXXVI. NEW SERIES.—APRIL, 1840.

Specification of the Patent granted to JOHN MILLER, of Bolton, in the County of Lancaster, Machine Maker, for an Improved Drilling-Machine—Sealed April 23, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said John Miller, do declare the nature of my invention of an improved drilling-machine, to consist in an apparatus by which I am enabled to drill or bore a series of holes, equi-distant from each other, in a superior and more economical way than heretofore, and the manner in which the same is to be performed and carried into effect is set forth and described in the accompanying drawing, and the following description thereof. In this drawing the scale is marked thereon, and the various letters and figures of reference indicate the same parts throughout.

Description of the Drawing.

Figure 1, represents a front elevation of my improved drilling-machine, and

Fig. 2, a side view of the same, in which three drills or
No. LXXVI.—Vol. XIII. c c

bits are used ; but I would remark that I do not confine myself to three drills or bits, as the number may be increased or diminished in any new machine, so as to be better adapted to the nature of the work for which it is designed. In this drawing A, represents the driving-pulley, that has motion communicated to it from any convenient source through the strap, B. This driving-pulley, A, is fixed to the driving-shaft, C, at the opposite extremity of which is geared a mitre-wheel, D, working into a corresponding wheel, keyed to the upright shaft, E. On the upright shaft, E, is placed a mitre-wheel, F, that is so fixed to the shaft, E, as to slide freely up and down, by means of a long key or feather, on the shaft, E, the wheel, F, having a corresponding recess, so as to revolve with it. The wheel, F, imparts motion, through the wheel, G, and shaft, G', to the bevils marked H, at its opposite extremity, and thus communicates a revolving motion to the centre spindle, I, at the top of which is fixed a small pinion, J, that gears into two corresponding pinions, fixed to the spindles on either side; and at the lower end of these spindles the drills, or cutters, K, K, K, are fixed.

Having now described the means by which rotary motion is imparted to the three drills, or cutters, I will explain the movements by which I cause the apparatus, or frame-work that contains the drills to be elevated, or thrown out of gear, when they have arrived to the depth required. This will be understood by referring to figures 3 and 4, which exhibit the gearing apart from the frame-work of the drills. On the shaft, G, is fixed the worm L, that communicates motion through the worm-wheel, L', fixed to the small upright shaft, M, having at its lower end the worm, N, that works or drives the worm-wheel, O, on the horizontal shaft, P. On this shaft is a clutch-box, Z, the moveable part of which is traversed by means of the fork, R, of the form shewn in the drawing. This fork is moved by the small pinion that is fixed to the small shaft, S, at one extremity of which is fixed two arms,

one of which is provided with the weight, τ . The frame-work that contains the spindles or drills, is suspended to the chain, u , that passes over the pulley, u^1 , and counter-balanced by a weight attached to its opposite end, marked w . This weight is made sufficiently heavy to raise the frame-work in which the drills are supported, which is fitted accurately to v edges upon the sides of the upright standard of the machine. On the small shaft, r , is a pinion, x , which gears into a rack, g , fixed to the back of the upright standard of the machine, by which a downward motion of the drills is effected. The end of the rod, y , to which is fixed the clip or fork, a , of the clutch-box, z , is flattened so as to leave a shoulder, that bears upon the under edge of the lever, b . This lever, b , is made to drop or fall a distance corresponding with the holes to be drilled or bored. Now it will be understood, that after the lever, b , has fallen the distance intended, the apparatus or frame-work that contains the spindles and drills, still continues to move downwards, until it has arrived sufficiently low to clear the small shoulder on the rod, y , as before described. The weight, τ , then acts upon the lever or arm, h , and moves the rod, y , backwards. On the rod, y , is fixed the clip or fork, a , by which the rod is disengaged from the gearing for lowering the drills and allow the weight, w , to elevate them. The clutch, z , is then put into gear by the operative, after the work has been adjusted, and the operation is repeated. The contrivance by which I regulate the exact number of divisions or spaces between the holes in the work to be drilled or bored, may be understood by referring to figure 1, where it will be seen that the table, v , upon which the work is placed, may be traversed in either direction, along the support or bed, A^1, A^1 . This table is actuated by a screw, revolving in bearings at each extremity, and passing under the whole length of the bed or support. At one end of this screw is fixed the dividing-wheels, f , by which the

176 *Berry's Patent for the Spontaneous Re-production*

number of holes in a given length, is correctly determined, by the pitch of the wheels, together with that of the screw, and to prevent what is technically termed "back lash," in the motion of the table, I employ two nuts, as seen at fig. 5, so fixed to the table as to allow of being moved nearer or farther from each other, when necessary, and thus compensate for the wear of the one by adjusting the position of the other.

Having now described the combination and operation of my improved drilling-machine, I wish it to be understood that I do not claim any of the separate well-known parts of which the machine is composed, but I do claim the combination and general arrangement of the machine hereinbefore described, for the purposes already alluded to, which being, to the best of my knowledge, new and never before used in this kingdom, I deliver this as a true and faithful specification of the same.—In witness whereof, &c.

Enrolled October 19, 1839.

Specification of the Patent granted to MILES BERRY, of Chancery Lane, in the County of Middlesex, Patent Agent, for a New or Improved Method of Obtaining the Spontaneous Re-production of all the Images received in the Focus of the Camera Obscura. —Sealed August 14, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Miles Berry, do hereby declare that the nature of the said invention and the manner in which the same is to be performed are particularly described and

ascertained in and by the following description thereof, reference being had to the plates of drawings hereunto annexed, and to the letters and figures marked thereon (that is to say) :—

Before proceeding to the description of this invention, I think it proper to make the following remarks. This invention or discovery relates to photogenic drawing or the spontaneous reproduction of images, pictures, or representations of nature by the action of light, that is, by the process or method now well known under the name of “daguerreotype,” I believe to be the invention or discovery of Messrs. Louis Jacques Maude Daguerre, and Joseph Isidore Niepce, Jun., both of the Kingdom of France, from whom the French Government have purchased the invention for the benefit of that country. This invention or discovery was fully communicated to me, by a certain foreigner residing in France, on or about the 15th of July, 1839, with instructions immediately to petition Her Majesty to grant Her Royal Letters Patent for the exclusive use of the same within these kingdoms, and in consequence thereof, I did apply for such letters patent, and Her Majesty’s Solicitor General, after hearing all parties who opposed the same was pleased on or about the second of August, now last past, to issue his report to the crown, in favour of the patent being granted; and it, consequently, passed the great seal in the usual course, being sealed on the day above named, which is some days prior to the date of the exposition of the said invention or discovery to the French Government at Paris by Messrs. Daguerre and Niepce, according to the terms of their agreement. And I will now proceed to describe this invention or discovery as communicated to me.

Description of the Process.

The reproduction of the images received at the focus of the camera obscura is effected on plates or surfaces

of silver which may be plated in copper. The copper serving to support the surface or sheet of silver, the combination of these two metals contributing towards the perfection of the effect. The silver employed should be without alloy or as pure as possible. The sheet of copper should be sufficiently thick to preserve the perfect smoothness and flatness of the plate, so that the images may not be distorted by the warping thereof, but the copper should not be thicker than what would be required to attain that end on account of the weight of the metal. The thickness of the two metals united need not to exceed that of a stout card. The process is divided into five operations: the first consists in polishing and cleaning the silver surface of the plate in order to properly prepare or qualify it for receiving the sensitive layer or coating upon which the action of the light traces the design. The second operation is the applying that sensitive layer or coating to the silver surface. The third in submitting, in the camera obscura, the prepared surface or plate to the action of the light so that it may receive the images. The fourth in bringing out or making appear the image; picture, or representation which is not visible when the plate is first taken out of the camera obscura. The fifth and last operation is that of removing the sensitive layer or coating which would continue to be affected and undergo different changes from the action of light, this would necessarily tend to destroy the design or tracing so obtained in the camera obscura.

Description of the First Operation.—Preparing the Silver Surface of the Plate.

For this operation are required, a small phial of olive oil; some cotton very finely carded; a small quantity of pounce or pumice powder ground extremely fine and tied up in a small bag of muslin, sufficiently thin in texture to allow the powder to pass easily through when the bag is

shaken; a phial of nitric acid, diluted with pure water in about the proportion of one part of acid to sixteen parts of distilled water; a wire frame or stand on which the plates can be placed so as to be heated by means of a lamp; lastly, a spirit or other lamp to heat the plates. The size of the plates or surfaces are limited by the dimension of the apparatus, the plates must first be well cleaned and polished. To effect this, begin by sprinkling the silver surface with pounce by shaking the bag without touching the plate and then with cotton impregnated with a little olive oil, rub it gently on, lightly moving the hand round in circles from the centre, *c*, (see fig. 2 plate 1,) the plates during this operation should be placed flat on sheets of paper which must be changed when necessary. The pounce must be sprinkled several times and the cotton changed several times during the operation of rubbing. The pestle and mortar used for pulverizing the pounce or pumice powder, should not be formed either of cast-iron or copper, but made of porphyry. The pounce should be ground afterwards on a glass plate with a glass muller, pure water being used in the operation. The pounce should be used only when perfectly dry. It will be readily conceived how important it is that the pounce or pumice powder should be sufficiently finely pulverized so as not to cause streaks or scratches on the silver surface, for it is in a great measure upon the fine polish of the surface of the plate that depends the beauty of the image, picture, or tracing produced thereon. When the plate is perfectly polished it must then be cleaned, this is effected by dusting or sprinkling the powder over the surface and rubbing it with dry cotton, the movements of the hand being made in circles, and backwards and forwards and up and down, crossing each movement in order to operate fully on all parts of the surface. This is the best mode of rubbing to gain the desired result. Next a small knot or tuft is made with carded cotton which is to be moistened with a

little acid diluted in water as above stated. To do this the knot of cotton may be placed on the mouth of the bottle containing the diluted acid and pressed thereon, the phial being then inverted and then placed again upright so that the centre of the tuft of cotton may be moistened with acid without deeply impregnating it; very little acid is required, and care must be taken not to wet the fingers with it. With this tuft so charged with acid the surface must be rubbed, care being taken to carry the acid uniformly over all parts of the surface of the plate; the cotton should be changed several times and the rubbing of the surface be made by moving the hand round and round, and crossing as before, so as to extend equally the acid, which, nevertheless, ought to do no more than cover slightly the surface of the plate. It will sometimes happen that the acid applied on the surface of the plate will be found to accumulate into small globules, these must be destroyed by changing the cotton and by rubbing the plate gently so as to spread evenly the acid; for on any places where the acid has been allowed to rest a time, or has not been laid evenly, it would form spots or stains. It will be seen that the acid is evenly spread upon the surface of the plate by its appearing covered with a uniform tint or what may be termed a thin veil or change of surface. The plate is finally to be sprinkled with pounce or pumice powder and cleaned by slightly rubbing it with a piece of carded cotton; instead of ordinary pounce calcined venetian tripoli may be used. The plate thus prepared is then to be submitted to a considerable degree of heat. To do this it is placed on a wire frame such as shewn at fig. 1 and 1 bis (plate 1), the silver surface being uppermost. Under the plate is to be placed a lighted lamp which is to be moved about so that the flame shall act equally upon all parts. When the plate has been submitted for about five minutes to this operation (or until the heat has acted equally upon all parts of the plate) it will be perceived that the surface of

the silver has obtained a whitish tint or coating and then the action of the heat must cease. This effect may be obtained by other means ; for instance, the heat of lighted charcoal may be used, which may be preferable, as the operation will be sooner finished. In this case the wire frame is unnecessary, for the plate may be laid on the stove or held with tongs, the silver surface always being upwards, and it may be moved backwards and forwards on the furnace, so as to heat it equally throughout, until the silver surface becomes covered with a whitish tint as above stated. The plate is next to be cooled rapidly, by placing it on a cold body or substance, such as a marble slab, or stone, or metal surface ; when cooled, it must be polished again. This may be quickly done since it is only necessary to remove the white tint, which has been formed on the silver surface. To effect this, the plate is to be sprinkled with pumice powder, and rubbed in a dry state with a portion of cotton ; this should be done on the surface of the plate several times, taking care to change the cotton often. When the silver is well polished it is to be rubbed, as above stated, with acid dissolved in water, and sprinkled with a little dry pounce powder, and rubbed slightly with a knot of cotton. The acid is then to be laid upon the plate, say three different times, care being taken to sprinkle each time the plate with powder, and to rub it dry and very lightly with clean cotton ; care should be taken not to breath upon the plate, or touch it with the parts of the cotton touched by the fingers as the perspiration would produce spots or stains, and dampness of the breath or of the saliva would produce the same defects in the drawings. When the plate is not intended for immediate use or operation, the acid may be used only twice upon its surface after being exposed to the heat. The first part of the operation may be done at any time ; this will allow of a number of plates being kept prepared up to the last slight operation. It is, however, considered indispensable that just before

the moment of using the plates in the camera, or reproducing the design, to put at least once more some acid on the plate, and to rub it lightly with pounce, as before stated ; finally, the plate must be cleaned, with cotton, from all pounce dust which may be on the surface or its edges.

Second Operation.—Coating the Surface.

For this operation are required the following implements : the box represented in plate 2, figs. 1 and 2, the thin board or frame shewn in plate 1, figs. 3 ; four small metallic bands of the same metal as the plates (seen also in figs. 3), a small handle as at fig. 5, plate I, a box of small nails or tacks, and a phial of iodine. After having fixed the plate upon the thin board or frame (the silver surface uppermost), by means of the metallic bands and the small nails, which are forced into the board by the handle ; some iodine is then to be put into the cup or dish, *D*, placed in the bottom of the box, plate 2, fig. 1. It is necessary to divide the iodine into pieces, in order to render the exhalation more extensively and equally diffused ; otherwise on the middle of the plate would be formed circles, or a kind of iris, or appearance of a rainbow in prismatic colours, which would prevent the plate from receiving a uniform impression. The thin board with the plate is then placed with the silver surface undermost, upon small brackets or supports, at the four angles of the box, its cover, *G*, is then closed. In this position the plate must be left, until the the surface of the silver be covered with a fine golden tinge, which is caused by the evaporation of the iodine, condensing upon the surface of the silver. If the plate were allowed to remain too long, this golden yellow colour would turn purple or violet colour, which must be avoided, because in this state the coating is not so sensitive to the effect of light. On the contrary, if this coating is too pale or not sufficiently yellow, the image taken from nature would be

very deficiently or faintly reproduced, therefore a coating of a golden yellow is particularly desired, because it is the most favourable to the production of the effect. The time necessary for this operation cannot be stated, because it depends on several circumstances, one is the temperature of the room wherein the operation is conducted, and another the state of the apparatus; for this process should be left to itself, and not be affected by the addition of any other heat than that of the room.

It is very important in this operation that the temperature inside the box be equal to that outside; if such were not the case on the plate being passed from a cold to a warm atmosphere, it would become covered with condensed moisture from the atmosphere, which would do great injury to the effect. This operation should be left entirely to the spontaneous evaporation of the iodine; also the more this box or apparatus is used the less time is required to effect the object, because the interior sides of the box become penetrated with vapour of iodine, and as it is the nature of this vapour always to evaporate, it will arise from all the internal parts of the box, and therefore will spread more evenly, and more quickly on the surface of the plate, which is very important, therefore it is proper to leave a little iodine in the cup on the bottom of the box, and also to keep the box free from damp. It is, therefore, evident that the apparatus will operate better, after being used several times. From the causes above stated, it is not possible to fix precisely, the time necessary for obtaining the coating of golden yellow tint, as the same may vary from five to thirty minutes, but rarely longer, unless the weather be very cold. It is necessary to look at and examine the state of the plate, from time to time, to ascertain whether it has attained the golden yellow tint required, but, it is important that the light should not be allowed to fall or strike directly upon its silver surface. It may happen that the plate be more coloured or tinted at one end than the other: in that

case, in order to equalize the tint, care must be taken in replacing the plate, to turn it end-ways or side for side. In order to accomplish these repeated examinations, without injuring the sensitive ground or coating, this process should be conducted in a darkened room, into which light is admitted sideways, not from the roof. The box should be placed in a dark room, where the light enters but feebly, as through a door left ajar. When the plate is to be inspected, the operator raises the lid of the box, when the board may be taken by its edges with the two hands and turned up rapidly, very little light being required to shew the true colour of the coating, and if the plate has not obtained the golden yellow tinge, it must be immediately replaced in the box, and there kept until it attains the proper gold colour; if on the contrary the colour is deeper, then the coating will not be of any use, and the plate is to be repolished and cleaned, the first operations being re-commenced. From written description this operation may seem difficult and tedious, but with a little practice an intelligent operator, would be enabled to judge accurately of the time required to obtain the desired golden yellow tint, and also to inspect rapidly the plate, so as not to give the light sufficient time for acting upon the coating. When the surface of the plate has attained the proper colour, the board with the plate must be introduced into the frame represented at figs. 1, 2, 3, 4, plate 3, which frame is adapted to the camera obacura. In this transference, care must be taken to prevent the light striking on the surface of the plate, and for this purpose the camera obscura may be lighted with a wax taper, the light of which has much less effect upon the coated surface; even this light ought not to be allowed to strike too long on the plate, as it will cause marks or traces on the same, if allowed to continue a long time. After this second operation is completed, the plate is to be passed to the third operation, or that of the camera obscura. Whenever it is possible the one

operation should immediately follow or succeed the other. The longest interval between the two should not exceed an hour, beyond this time the action of the iodine and silver surface will lose their requisite photogenic properties. But previous to passing to the third operation, I would add the following remarks or observations.

First Observation.—Before using the iodine-box the interior should be well cleansed and the box itself turned upside down, in order to empty it of all the particles of iodine which may have escaped from the cup; care must be taken not to touch the iodine with the fingers. During the operation of coating the surface with iodine the cup should be covered with a wire or other gauze, stretched on a frame; this gauze has the effect of regularly distributing the evaporation or vapour of the iodine upon the surface of the plate, and at the same time to hinder, whenever the lid of the box is closed, the compression of air thereby occasioned from causing the particles of iodine to be scattered or fly about within the box, which particles might strike the plate and cause spots or blotches thereon: for this reason, the lid of the box should always be closed quietly. The same observation applies in case particles of dust should rise inside the box, which being charged with the vapour of iodine might injure the plate by coming in contact with its surface.

Second Observation.—The iodine-box or apparatus above described may be varied according to circumstances or be substituted by the following contrivance: a thin deal board similar to the one used for fixing the plates upon is first to be saturated with the vapour of the iodine; this may be done in a box similar to the one above described, or even in a box only two inches high. This board, when once properly saturated, may be placed in a small box two inches high, of the proper length and width, and provided with three grooves or ledges, one to receive the metallic plate or silver surface, and the two others to receive the

saturated board, which may be placed nearer to, or further from the metallic surface. When placed in the first groove or ledge it may be at a quarter of an inch distance from the plate, in the second it may be at a distance of half an inch or more; this second groove or further position need only be used in case the operation of coating the surface should proceed too fast in consequence of increase of temperature or in case the plate should have been withdrawn before it has reached its proper degree of golden colour. This mode or process of coating the surface has the advantage of enabling the operator to coat the plate with iodine with great rapidity, that is to say, generally in a very few minutes. If the operation should proceed too fast, the saturated or iodine board may be placed in the upper groove, and the metallic plate underneath this position causes the operation to proceed slower. It is necessary that this iodine-box should be securely closed to hinder any current of air reaching the surface, and moreover in this latter case the box should only open on one of its sides. The board saturated with iodine may be made to serve to coat several plates during a whole day or even several days without the necessity of replacing it in the iodine or saturating box. I will now proceed to describe the next operation.

Third Operation.—The Camera Obscura.

As before stated the operation should proceed as quickly as possible from the second to the third operation, at this time the combination between the iodine and the silver has no longer the same property. The apparatus necessary for this operation is the camera obscura (see plate 4, figures 1 and 2,) adapted and fitted to receive the prepared plates and their boards. This third operation is that in which, by means of light acting through the lens of the camera obscura, nature reflects or impresses (to use figurative language) an image of herself of all

objects enlightened by the sun, on the surface of the photographic or prepared plates. The objects (of which the image is to be retained upon the surface of the plate) should be as much as possible lighted by the sun, because then the operation is more expeditious. It is easy to conceive that this operation being produced only by the agency or effect of light, that the action is the more rapid according as the objects are more brilliantly lighted up or illuminated or in their nature are more intensely white or present bright lines or surfaces. After having placed the camera obscura opposite to, or in front of the objects of which it is desired to fix or retain the image or obtain a representation, it is essential first to properly adjust the focus of the camera obscura so that the objects be represented perfectly clear and distinct, this is easily done by moving forward or backward, the frame of a plate of ground glass in the camera, which glass receives the images of the objects from the lens. When this frame is brought to the proper position, this moveable part of the camera obscura is fixed, by means of screws applied for that purpose. The ground-glass is then removed from the instrument, care being taken not to move the camera obscura, and in the place of the ground-glass is substituted the apparatus carrying the prepared metallic plate or surface (see figs. 1, 2, 4, and 5, plate 3,) which apparatus exactly fits the place of the ground-glass plate on its frame. During the time the apparatus with the prepared surface is being fastened into the instrument by small brass buttons or other fastenings, the camera obscura is closed; the obscuring shutters or doors, B, B, of the apparatus are then opened by means of the two semicircles, A, A; the plate is then in a proper position to receive and retain the impression of the image of the objects chosen. Nothing more need be done but to open the aperture of the camera obscura and to consult a watch to reckon the minutes the prepared surface shall be under the action of the light. This operation is of a very

delicate nature and should be carefully attended to, because nothing is visible, and it is quite impossible to state the time necessary for the reproduction of the image as it depends entirely on the intensity of light received by or from the objects, the image of which is intended to be reproduced; the time may vary from three to thirty minutes. It must likewise be remarked, that the seasons as well as the hours of the day have great influence on the rapidity of the operation; the most favorable hours are from seven in the morning, till three in the afternoon; the process of reproduction which may require from three to four minutes in the months of June and July, will require from five to six in the months of May and August, from seven to eight in April and September, and so on in proportion, as the seasons advance. This is only a general and approximate statement for objects strongly lighted, as it often happens that twenty minutes are necessary for the operation in the most favourable months, that is, when the objects are partially in shadow or darkness. It will be seen from what has been stated that it is impossible to name exactly the time necessary for obtaining images or tracings from nature or photographic design, but by a little practice it may be easily ascertained, practice is the only sure guide, and with this advantage an operator will readily ascertain the required time correctly. Latitude of the situation is of course to be considered, for example it is conceived that in the south of France and generally in all the countries where the light is very intense, as in Spain or Italy, the plates will receive the impression much more rapidly. It is, however, very important not to allow more time to pass than what is necessary for the reproduction, because the clear parts would no longer be or remain white or clear, they would be darkened by the prolonged action of the light allowed to strike upon the iodine on the surface. If on the contrary the time allowed is not sufficient, then the proof or image would be vague and without proper

details. Supposing the operator has failed in one proof, it being imperfect on account of its having been withdrawn too soon or left to remain too long, another may be begun immediately, a plate having been previously prepared; the operator is then more certain of obtaining the proper effect, the second operation being corrected by the first. It is desirable and useful in order to acquire proper practice to make some experiments of this kind. The plate or surface having been submitted to the action of the light the required time, I will proceed to describe the



Fourth Operation.—The Mercurial Process.

The operator must hasten to submit the surface of the plate to the fourth operation, as soon as it is withdrawn from the camera obscura. Not more than one hour ought to be allowed to expire between the third and fourth operations, and it is much more certain to obtain good proofs or tracings of nature, when the fourth operation takes place immediately after the third. For this operation are required the following implements: first a phial containing a quantity of mercury or quicksilver; second a spirit or other lamp; third the apparatus represented in plate 5, figs. 1, 2, 3; fourth, a glass funnel with a long neck. By means of the funnel, the mercury is poured into the cup, c, situated in the bottom of the apparatus (shewn in the figures,) and in a sufficient quantity to cover the ball or globe of the thermometer, F; from this time no day-light must be admitted, and the room must be darkened, and the light of a candle or taper only be used, to enable the operator to inspect the progress of the operation. The board on which is fixed the plate must be withdrawn from the apparatus already mentioned, as adapted in the camera (see plate 3, fig. 4,) which apparatus preserves it from the contact of light. The thin board with the plate is then introduced in the grooves or

ledges of the blackened board, *m*, plate 5, fig. 1; this black board is then replaced in the box or apparatus, which maintains it at an inclination of forty-five degrees, the prepared metal surface being placed undermost, so that it may be seen through the side glass, *g*. The cover, *a*, of the box must be put down gently, to prevent any particles of mercury flying about in consequence of the compression of the air. When the whole is thus prepared the spirit-lamp is lighted, and placed under the cup containing the mercury, and allowed to remain until the thermometer (the ball of which is immersed in the quick-silver bath, the tube extending outside the box) indicates a temperature of sixty degrees Centigrade, the lamp then must be removed; if the thermometer has rapidly risen it continues to rise, even when the lamp is removed, but it should not be allowed to rise above seventy-five degrees Centigrade. The impression of the image of nature now actually exists on the plate, but it is not visible; it is only after several minutes of time has elapsed, that faint tracings of the objects begin to appear, as may be readily ascertained by inspecting the operation, or looking through the glass assisted by the light of a candle or taper, which must not be allowed to strike too long on plate, because it would leave marks on the same. The plate should be left in the box, until the thermometer has fallen forty-five degrees, then the plate is to be taken out and this operation is finished. When the objects or articles (the reproduction of the images, of which it is intended to be produced) have been highly illuminated, and the light has acted a little too long in the camera obscura, this fourth operation will be finished, even before the thermometer has gone down to fifty-five degrees; this effect may be perceived by looking through the glass, *g*. It is necessary, after each operation, to wipe or clean well the interior of the apparatus, in order to remove the slight coating or layer of mercury which generally covers or adheres to it. The black board or frame, *b*, must

likewise be carefully wiped, that it may not retain any particles of quicksilver. When the apparatus is to be packed up for carrying it from place to place, the mercury which is in the cup must be poured into the phial; this is done by inclining the box so as to let the mercury escape through the small cock, *κ*, at the side of the apparatus. The picture or plate may now be inspected by means of a weak light, in order to ascertain whether the operation has succeeded or not. It may be taken off from the thin board, by removing the metallic bands or straps, which band should be cleaned carefully from any iodine or mercury they may have received by means of pounce and a little water; this should be done after each tracing is taken or plate operated upon.

It will be readily conceived that this cleaning is necessary, since not only these small bands are covered with a coating of iodine, but they have also received a portion of the tracing from nature. The plate is then to be placed in a box provided with a cover and grooves, as represented in plate 2, fig. 3, until it can undergo the fifth and last operation. This operation need not be effected immediately, for the plate or sketch may be kept in this state for several months without undergoing any alteration; provided, however, it be not frequently inspected or exposed in the open daylight. I will now proceed to the last operation, viz. the

*Fifth Operation.—Fixing the Tracing, Delineation,
or Picture.*

The object of the fifth operation is to remove from the surface of the plate, the coating of iodine, which otherwise on its being exposed too long to the action of light would continue to be decomposed, and would thereby destroy the picture or tracing. For this operation are required the following articles: first, water saturated with sea-salt, or a weak solution of hypo-sulphate of pure soda; secondly, the apparatus represented in plate 6, (figs. 4,

and 4 bis) ; thirdly, two troughs of metal as shewn in plate 6, (figs. 2, and 2 bis); fourthly, a vessel or jug full of distilled water, as plate 6, (fig. 4). In order to remove the coating of iodine, the operator must take the common salt, and put it into a bottle with a large mouth, the bottle being filled with pure water. To accelerate the dissolving of the salt, the bottle may be shaken from time to time; when the water is completely saturated, (that is when it will dissolve no more salt), it is to be filtered through blotting-paper, that no extraneous matters may remain in it, and that it may be perfectly clear. Water saturated with salt may be prepared in sufficient quantity before hand, and kept in corked bottles; by this means the necessity and inconvenience of preparing it every time is avoided. Into one of the troughs, the salt water is to be poured, until it is about an inch in depth, the other trough is to be filled with pure water; these two liquids are warmed or heated in temperature, though not to the boiling point. In place of the solution of salt, may be substituted a solution of hypo-sulphate of pure soda, this latter is even preferable because it completely removes the iodine, which is not always the case when sea-salt is used, especially if the designs or tracings have been obtained some time, and laid aside between the fourth and fifth operations. The mode of operation, however, is the same for the two solutions; although the solution of hypo-sulphate does not require to be warmed, and a less quantity of it is required than of the salt and water, since it is sufficient that the plate should be covered with the same, when laid on the bottom of the trough. The plate is first to be immersed in the pure water contained in one of the troughs; it must only be dipped in and drawn out immediately, it is sufficient that the surface of the plate be covered with water, and then without allowing it to dry, it is to be plunged immediately in the salt water. If the plate is not dipped in pure water before immersing it in salt water or in the solution of hypo-sulphate, these solutions would make

marks or spots on the surface of the plate. To facilitate the action of the salt water or of the hypo-sulphate which absorbs the iodine, the plate should be moved about in the liquid, by means of the small hooked instrument, as shewn at fig. 3, (plate 6,) the end of it being placed under the plate, so as to raise it and let it drop several times, thus producing a gentle washing of the surface. When the yellow colour or tint of the iodine is entirely removed from the surface of the plate, it is to be removed and carefully taken by the edges, so as not to touch or injure the drawing, and then dipt immediately in the first trough of pure water. The apparatus shewn in plate 6, fig. 4, and 4 bis, and the vessel, fig. 5, are then brought into use; these must all be perfectly clean, and the vessel, fig. 5, filled with distilled water which should be hot, but not boiling. The plate, on being withdrawn from the trough of water, is to be placed immediately on the inclined plane, *ε*, fig. 4, plate 6, and without allowing it time there to dry. The operator is then to pour upon the surface bearing the drawing, the hot distilled water beginning at the top of the plate, and pouring the water over it in such manner that it shall flow over the surface, and carry away with it all the solution of sea-salt or of hypo-sulphate, which has been already considerably weakened by the immersion of the plate in the first trough. If the hypo-sulphate solution has been used, the distilled water to be poured over the surface, need not be so hot as for the common salt solution. Not less than a quart of hot distilled water is required for thus washing the surface of a plate measuring eight or nine inches long, by six or seven inches wide. It sometimes will occur that after having poured warm water on the surface, some drops or globules of water will remain on the plate; in this case they must be removed before they have time to dry, as they might contain some particles of sea salt or iodine and injure the drawing, they are readily removed by strongly blowing on the plate. It will be understood how important it is

that the water used for this washing should be perfectly pure, for part of it will dry on the surface of the plate, notwithstanding the rapidity with which it may have passed over it, and if it contains extraneous matter, then numerous and indelible spots would be formed on the drawing or tracing. In order to ascertain that the water is suited for this washing, a drop may be let fall on a burnished plate, and if, when evaporated by heat it leaves no stain or mark behind, it may be employed without fear; distilled water is always sufficiently pure for this operation without testing it. When this washing is completed the picture drawing or tracing is finished, the only thing now to be done is to preserve the surface from being touched, also from dust and from vapours which tarnish silver. The mercury which traces the images, or in other words, by the action of which the images are rendered visible, is partly decomposed, it adheres to the silver, it resists the washing by the water poured upon it, by its adhesion, but it will not bear any rubbing or touching. To preserve these drawings they must be covered with glass, securely placed a little above the surface, both the edges of the glass and plate secured by pasted paper, or other means, and they are then unalterable even by the light of the sun. It may happen that in travelling, the operator may not be able conveniently to thus secure the plates, they may be preserved by enclosing them in a box similar to the one represented in plate 2, fig. 3; for greater safety small bands of paper may be pasted over the junction of the box and its cover. It may be necessary to state that the silver surfaces may be used several times in succession, provided the silver be not polished or ground through to the copper. And it is very important to remove, after every time of using, the mercury traced on or adhering to the surface, which is to be done, as before described, by means of pounce or pumice powder and oil, and by changing the cotton often, otherwise the mercury would finally adhere to the silver, and the proofs obtained on

that combination would always be imperfect, because they would be deficient both in vigour and clearness.

Explanation of the Drawings hereunto annexed, of the Apparatus used in the Processes or Operations of the Daguerrotype.

Plate 1, and fig. 1, represents a plan view of a wire frame.

Fig. 1 bis, is a side view of the same ; this frame serves to receive the plates when they are to be heated by the spirit-lamp, as shewn at B, fig. 6, A, being its cover or stopper, to prevent the spirit evaporating when the lamp is not in use.

Fig. 2, represents a plate with a silver surface, upon which the tracing is to be taken ; its size may be varied at pleasure. To make tracings of large dimensions the focus of the object-glass must be increased, as also all the other parts of the apparatus. Fig. 2 bis, shews the edge or thickness of the plate, it may be very thin, but it is essential it should have a very flat surface.

Fig 3, is a plan view of the thin board or tablet, on which is fixed the plate for the subsequent operations. The plate is secured on it by means of four thin metal bands, B, (one of them being shewn detached above, fig 3 bis), plated with silver ; they should be of the same thickness as the plate. These bands are fixed on the board by small nails forced or driven into the board through holes, D, by pressing the handle, shewn at fig. 5, upon them. The surface of these bands, being nearly level with that of the plate, retains it by small projections or pieces soldered on them, as seen in the drawings. These metallic bands have two offices to perform ; one to secure the plate, and the other to facilitate the equalization of the coat of iodine, which might otherwise be more intense on the edges or borders of the plate than on its centre.

Fig. 3 bis, shews the board and plate as seen edgeways.

Fig 4, represents the muslin bag containing the pounce or pumice powder.

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Plate 2, fig. 1, is a vertical section of the iodine box or apparatus, taken in the line, A B, fig. 2, wherein the coating of iodine is obtained upon the silver surface.

Fig. 2, is a plan view of the same. C, is an interior cover closing the lower part of the box ; it serves, when the apparatus is not in operation to concentrate the evaporation of the iodine, which condenses on the wooden surface of this part of the box. D, is the cup or dish for containing the iodine. E, is the thin board to which is fixed the plate (as represented in plate 1, fig. 3,) the silver surface being downwards, it is thus placed in order to obtain the coating of iodine, as the vapour thereof rises upwards ; the board rests on brackets, F, placed at the four angles of the box, the cover, C, being previously removed. G, is the lid or cover of the box which should be kept shut, excepting when the plate is taken out for examination. H, H, are small rods at the four corners of the inclined lining, K, of the box, to support the cover, C. J, represents a disc or sieve of wire or other gauze, which is to be placed over the cup, in order to equalize the dispersion of the evaporation of the iodine ; it serves also to prevent, in case the box should be closed too rapidly, the compressed air from driving out of the cup, particles of the iodine, which might adhere to the plate, and cause spots on the drawing. K, is the wooden lining formed with inclined sides, in the shape of a square funnel ; this shape assists to diffuse equally the vapours of iodine, which spread as they rise. Fig. 3, represents a magazine box or case and its cover, in which may be enclosed the plates or surfaces, before and after the drawings have been taken ; the plates are introduced into and secured by small grooves in the insides, so that they cannot rub against one another, they being at the same time preserved from dust. By pasting strips of paper on the junctions of the cover and box, they may be preserved from all injurious vapours, but this is requisite only for plates or drawings completely finished, or in case the box should not close well.

Plate 3 ; this plate represents four different views of the frame, which receives the thin board carrying the plate or silver surface, and serves to preserve it from the effect of light, as soon as it has received the coating of iodine in the box, shewn in plate 2.

Fig. 1, is an edge view.

Fig. 2, a front view, shewing the covers or doors to shade the silver surface.

Fig. 3, is a section, shewing the doors in the position they will be in when the plate is exposed to the action of the light in the camera.

Fig. 4, is a view of the back side the reverse of fig. 2. A, A, are semi-circular pieces for opening the doors, B, whenever this frame with the plate is placed in the camera obscura. C, is the thin board on which is fixed the plate. D, D, are buttons on both sides of the frame to fasten the board and the doors. E, shews the thickness of the frame. F, is the plate or surface intended to receive the picture.

Fig. 5, represents the frame with the doors open, as they are at the time when a tracing is taken in the camera obscura.

The Camera Obscura Process.

Plate 4, fig. 1, is a vertical section taken through a camera obscura adapted for the process of daguerreotype or photogenic delineation furnished with a frame for carrying the plate of ground glass, A. The distance this glass plate is to be from the object glass or lens is the same as the distance at which the surface intended to receive the image is placed with the frame and shading-doors, as shewn in c, fig. 2, which figure is a horizontal section of the camera obscura. B, is a mirror for observing the effect of objects and selecting points of view ; this mirror serves to enable the operator to choose the scenery, the image of which is to be reproduced ; it should be inclined about forty-five degrees to the horizon by means of the rod, L. In order to bring the objects

precisely in the focus, the ground glass should be completely exposed and the objects looked at as reflected on the ground glass. The image of the objects is easily brought into the proper focus by moving forward or backward, the sliding-box, *D*, taking hold of it at the bottom with both hands by the projections, *E*, fig. 2, and forcing it to or from the operator. When the focus is properly adjusted the thumb-screw, *H*, is turned to fix the parts in this position. The mirror is kept closed by means of two hooks, at *F*, which take into small eyes, at *G*; the frame and ground glass plate is withdrawn, and in its place is substituted the frame carrying the prepared plate or surface which is so represented in fig. 2, with the shading-doors, *B*, open in the camera obscura; these doors should be internally lined with black velvet as well as the sliding-box, *D*, to avoid all reflection of light. The object glass is achromatic and periscopic, the concave part must be outside of the camera obscura, its diameter is about three and a half inches and its focus about 13 inches. A diaphragm is placed before the object-glass at a distance of about three and a half inches and its aperture may be closed by means of a plate on a pivot. This camera obscura reverses the objects from right to left which is not of much consequence in a great number of cases, but if it is desired to have an image or drawing or tracing in the natural position of the object, a flat looking glass or mirror is to be placed on the outside beyond the aperture of the diaphragm, as at *K* to *J*, fig. 2, it being fixed by means of a screw at *K*; but as this arrangement of reflexion occasions a loss of light and injures the photogenic process, therefore about one-third more time must be allowed to obtain a tracing or drawing.

The Mecurial Process.

Plate 5, represents the apparatus in three different views.

Fig. 1, is a vertical section of the apparatus.

Fig. 2, front elevation ; and

Fig. 3, is a side view, shewing the thermometer. A, is the cover of the apparatus. B, the black board with grooves to receive the board, C, carrying the silver surface or metallic plate. C, the cup containing the mercury or quicksilver. D, is the spirit-lamp. E, is a small cock through which the mercury may be withdrawn, the apparatus being inclined on one side for that purpose. F, is the thermometer. G, is a glass window, through which the progress on the silver surface may be inspected. H, is the board, carrying the metallic plate which has received the image or design. I, is a stand or support for the spirit-lamp held by the ring, K, so that its flame may play on the centre of the cup ; all the interior parts of this apparatus ought to be blackened and varnished.

The Washing Apparatus.

Plate 6, fig. 1, represents a funnel lined with blotting paper, in order to filter the solution of water and sea-salt or the solution of hypo sulphate of soda.

Fig. 2, is a plan view of one of the troughs made of copper, tinned. In the bottom of this is represented the plate, B, with a drawing on it ; two such troughs are required, one for the salt-water, and one for the pure water.

Fig. 2 bis, is a side view of one of them.

Fig. 3, represents a small hook of copper, tinned, which serves to raise the plate in the basins to agitate it and to draw it out more easily.

Fig. 4, is a front representation of the washing apparatus made of tin varnished. To wash the designs on the plates they are placed on the stand or angular ledge, D. E, is a ledge to conduct the water to the receptacle, C ; and

Fig. 4 bis, is a side elevation of this washing apparatus.

Fig. 5, shews the jug or vessel with a large spout or lip ; it may serve to heat the distilled water in, and to

pour it on the drawing when placed on the ledge, D, as seen, at B, fig. 4. In witness whereof, &c.

Enrolled February 14, 1840.

Specification of the Patent granted to RICHARD HODGSON, of Salisbury Street, Strand, in the County of Middlesex, Gentleman, for Improvements in the Forms or Shapes of Materials and Substances used for Building and Paving, and in their Combinations for such Purposes.—Scaled June 27, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Richard Hodgson, do hereby declare that the invention in the forms or shapes of materials and substances used for building and paving, and in their combination for such purposes, has for its object to effect the following improvements in the art of construction, namely :

First. The formation of a perfectly horizontal platform without the aid of an arch.

Secondly. The formation of a horizontal platform, superseding the use of the arch, by the adoption of a peculiar, but simple and regular, form of construction, in which all the materials are of the same shape, and the weight or pressure acts perpendicularly and equally upon each material or stone. Whereas in the construction of horizontal platforms, by means of arches, the only mode hitherto known, all the materials must be of different forms and inclinations, according to the situation in which they are proposed to be placed, and the pressure is lateral, and dependent upon the key-stones and abutments only.

Thirdly. The application of this principle of construction to buildings in general, instead of the only principle

hitherto known, that of forming all the materials of a perpendicular and rectangular shape, the present invention accomplishing the same result by means which add considerably to the strength and solidity of the building ; viz. by producing the perpendicular equilibrium and external rectangular form, by shaping all the materials, or component parts, according to the precise, fixed, and determined acute angle, set forth in the drawing hereunto annexed.

The invention, in fact, consists in forming or shaping materials or substances according to a new section of the cube (such invention being communicated to me by a foreigner, and called by him the stereotomy of the cube), which section is obtained by dividing the cube into eight equal prisms, or parts, four of which are to be taken from the perpendicular corners of the cube, and the other four to be left remaining as a compact solid body, but presenting the appearance of two solids or parallelopipeds, of equal shape and size, lying obliquely across each other, and inclined, in opposite directions, the angle of their inclination being determined and invariably fixed, as represented by the drawings annexed hereto, and being found, by logarithmic calculation, to be exactly 63 degrees, 26 min., 5 sec., and 8-10ths of a second. The mode of ascertaining and forming this angle with accuracy and correctness, and upon which the success of the invention wholly and entirely depends (inasmuch as it is the only angle which causes the diagonal joining the obtuse angles of the two parallelopipeds to fall in a perpendicular straight line, and which, therefore, produces an inclined surface, having the property of keeping a perpendicular tendency), is to draw a square, representing one side of the cube, and to divide the upper side thereof into two equal parts, and, from the point of division, to draw an oblique line to the extreme point on the right at the bottom of the square, and to divide, in like manner, the bottom side of the square into two equal parts, and, from the

point of division, to draw another oblique line to the extreme point on the left at the top of the square thus forming two oblique parallel lines, or a parallelogram, and in the same manner, on the square, representing the opposite side of the cube, to form two oblique parallel lines, but in the inverse or contrary way; that is to say, to divide the top side of the last mentioned square into two equal parts, and, from the point of division, to draw an oblique line to the extreme point on the left at the bottom of the said square. Also to divide, in like manner, the bottom side of the said square into two equal parts, and from the point of division, to draw an oblique line to the extreme point on the right at the top of the said square, forming two parallel lines, or a parallelogram, as before, which operations will present at the upper and lower surface of the cube, two squares united at the angles, and forming one-half of the whole cube. I further declare, that the shapes and forms, before described, with their combinations, are applicable generally to materials and substances employed in building and paving, whether of stone, iron, bricks, or wood; and that the said shapes and forms must, in all cases and materials, be essentially the same, yet that they may be usefully obtained and combined together in different ways, according to the nature and quality of the materials employed, in the manner hereinafter mentioned.

First, the shapes and forms, before described, are, in the case of stone, marble, or other similar substances, to be formed by sawing or cutting the same out of the full-size of the cube, and leaving them entire in their relative dimensions, so as to be ready to be placed together, either horizontally, vertically, or obliquely, as the case may require, and with or without the joints being filled with cement, mortar, or plaster.

Secondly, iron may be wrought or cast from models made for the purpose; and although the angles are to be strictly the same, the thickness may be modified accord-

ing to circumstances, and the mode of uniting them is by screwing, or otherwise securing, the two oblique surfaces together.

Thirdly, bricks may be of the same shape and form as described for the stone, and put together with or without cement or mortar ; but it is not necessary to make them so thick, as described under the head No. 1. Bricks may also be made singly, and put together when used, so as to produce the same shape and forms as if made and moulded in a solid body ; and, in doing so, it is proper to form the separate parts, one with a recess, and the other with a projection to fit. Bricks of the same shape may also be made with holes or grooves therein to be applied, in certain cases, to the roofs of furnaces, and similar erections, not only for the purpose of diminishing the weight, but also for the purpose of giving a divided, free, and more diffused issue to the heat.

Fourthly, the shape and form in wood must be precisely the same as described for the stone to No. 1 ; but in order to lessen the expense, both in labour and material, attendant upon producing the shape from a solid cube, the same form may be obtained by making the solid body from two equal parts or blocks, which must be pegged or dowed together at the centre of each isosceles triangle, forming the lozenge presented by their lateral surfaces, the peg or dowel being in the centre of each isosceles triangle, as will appear in the said drawing hereunto annexed.

For wood paving, a peculiar disposition of the materials or blocks thus shaped, and, if necessary, pegged or dowed, will be required, inasmuch as the blocks will have to bear a great superincumbent weight, which will be continually moving and rolling over them ; they should, therefore, be laid upon solid, firm, dry ground, or other solid, firm, dry foundation. As to the depth of the blocks, in ordinary cases, it will not be necessary to have them more than half the depth of a whole cube (say one of

twelve inches), as described in Nos. 1 and 4; but the angle in all cases to be the same. The solid body to be formed by two separate blocks dowelled together with two strong pegs or dowels, placed in the centre of each isosceles triangle, forming the lozenge which represents the two lateral faces of the blocks, as described in the annexed drawings. Each row of blocks should be also pegged together on the same principle, or they may be united by any bituminous compound usually employed for similar purposes, so as to form one compact body, and prevent the blocks being disengaged or separated one from the other. It is necessary to add, that the blocks may be packed up together in the workshop in large, square, or oblong masses, as shewn in the said drawings hereunto annexed, so as to be laid down more speedily on the prepared ground, where these masses must be fastened or united together, either with pegs or with any bituminous compound usually employed for similar purposes. It should be further observed, that the wooden blocks must and will be necessarily placed nearly vertically as the tree grows; it should also be stated, that according to the traffic in the roads or streets, where the wood paving is intended to be laid down, its depth or substance must be increased or diminished according to circumstances. The wood-paving may, in most cases, be laid across the roads or streets from side to side, so as to terminate each row of blocks, or square masses of blocks, against the stone-channel on the kirb-stone, as the case may be, and the blocks, or square masses of blocks, must be cut or terminated in two perpendiculars, so as to form proper abutments to each other, or to the kirb-stone. In some cases, however, where it may be necessary, the square masses of blocks may be placed in various directions, such as, for instance, in a diagonal line. The top face of the blocks may also be usefully grooved at distances not exceeding six inches apart to prevent the sliding or slipping of horses.

Descriptions of the Drawings.

Drawing No. 1, consisting of six figures, represents substances or materials formed or shaped according to the aforesaid division of the cube. A and B, shew that the portion of the cube, which, in a solid body, forms the general shape (consisting of two parallelopipeds) to be given to all substances and materials; the figs. 1 and 2, denoting one moiety or parallelopiped of such solid body and 3 and 4, the other moiety or parallelopiped, placed and crossing each other in opposite directions, and joined together in such cases where they cannot conveniently be formed out of or of one solid mass. c, d, e, and f, represent the perpendicular corners of the cube which are to be taken out of it to obtain the forms and shapes shewn by the figs. A and B, when cut from the solid.

Drawing No. 2, consisting of six figures, represents the two modes of obtaining the exact angle with correctness. A and B, shew the two paralelograms of the front and back faces of the solid body or parallelopiped, extracted from the cube and placed in opposite directions, as directed in the drawing No. 1. c and d, shew the two isoscles triangles of the front and back faces of the figure, B, in drawing No. 1; and fig. e, shews the two squares of the upper surface united at the angles, forming one-half of the whole square; and fig. f, shews the similar squares of the bottom surface, placed of course the contrary way.

Drawing No. 3, shews the principle applied to platforms in bricks or stone, and which are formed by uniting the several solid portions of the cube laterally, the joints being united together with or without cement or mortar. This figure is intended to represent the application of the principle to platforms instead of arches over all windows and other similar apertures, to roofs and floors of houses and buildings, bridges and other similar purposes.

Drawing No. 4, consisting of the two figures, represents the elevation of a column, shewing the two different sides
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and built according to the same principle by placing the several solid portions of the cube one over the other in order to evince the advantage arising from that shape, namely, that by divesting the cube of one half of its substance and weight, the form which remains, still preserves the same principle of equilibrium and perpendicular tendency as if it had remained in its entire and solid state.

Drawing No. 5, consisting of three figures, represents, by No. 1 and 2, of those figures, frames of wrought or cast-iron bolted together upon the same principle, and at the same angle as previously directed, and No. 3, shews the plan.

Drawing No. 6, consisting of five figures, represents the different kinds of bricks to which the principle is applicable, the advantages of which are precisely the same as described for other substances, and particularly for roofs of furnaces, ovens, and other similar erections, some of which may require a roof of pierced or open work.

Drawing No. 7, consisting of eight figures, represents the principle as applied to wood pavement. No. 1, shews the shape of the block, supposing it to be cut or made out of one solid piece of wood. No. 2, shews one of the parallelopipeds cut separately, to be afterwards coupled with another similar one by pegs, as in fig. 1. No 3, shews how in some instances greater strength may be obtained by means of intercutting or dovetailing the blocks at their isosceles triangles. No. 4, shews the mode of pegging, in order that one block may be united to two others adjoining. No. 5, shews the exact position of the two pegs, in the centre of each isosceles triangle as shewn by the letters, A and B. No. 6, shews a range of the blocks as laid across the road or street, pegged and united together. Nos. 7 and 8, shew how the blocks may be, in the workshop, disposed and packed up in large oblong or square masses, and the lines, a, l, shew the direction in which these masses may be placcd across

the street, *r*, being the right, and *l*, the left sides of the street.

Drawing No. 8, consisting of one figure, represents the principle as applicable to railways or other similar purposes, in one block cut solid out of one piece of wood, or in two united and bolted together.

Having thus described the nature of the invention, and the manner in which the same is to be carried into execution, I would have it understood that what I claim is the invention of, first, the mode of forming or shaping materials or substances for building, paving, and other purposes, according to the division of the cube herein described.

Secondly, the mode of employing in combination for building, paving, and other purposes, blocks, materials, or substances, so formed or shaped.—In witness whereof, &c.

Enrolled December 27, 1839.

Specification of the Patent granted to BARCLAY FARQUHARSON WATSON, of Lincoln's Inn Fields, for Improvements in Crushing or Preparing New Zealand Flax (Phormium Tenax).—Sealed December 17, 1838.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso I, the said Barclay Farquharson Watson, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The invention consists of a mode of constructing a

machine for crushing or preparing New Zealand flax (phormium tenax) ; and in order to give the best information in my power, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, represents a machine, partly in section, constructed according to my said invention.

Fig. 2, is a plan of part of the machine. In each of these figures the same letters indicate similar parts.

It is well known that in order to manufacture New Zealand flax (phormium tenax) into thread or yarn, it is necessary to prepare the same by crushing, in order to separate the fibres and to get rid of the refuse matters, which, according to the means at present resorted to, is not accomplished with that advantage and facility, as to obtain such beneficial results as are desired.

Now the object of this invention is to perform such preparing or crushing process on New Zealand flax (phormium tenax), in a more advantageous manner than it has been heretofore done; and the invention principally relates to the mode of forming the bed or surface on which the operation of crushing is performed.

In fig. 1, the bed or surface on which the crushing takes place is shewn in section, by which the construction of the bed may readily be understood, and it will be seen that it is made up of a series of upright blocks of wood, each block having the grain thereof vertical, and the wood which is preferred is oak or elm, but others may be employed, the invention not relating to the description of wood used, but to the mode of applying the same in the constructing a surface on which the New Zealand flax (phormium tenax) is to be crushed. Each of the blocks, *a, a*, are shewn to be square, which is a convenient figure for going together to make up a complete surface, but other figures or shapes of blocks may be employed. *b, b*, is the outer circumference rising above

the upper surface of the bed, which is hooped strongly together, as is shewn in the drawing, by the hoops, *c, c*. It should be understood that the upper surfaces of the blocks, *a, a*, do not produce a smooth or even plane, but the blocks, *a, a*, are so arranged as to produce a very irregular surface, and in such manner that no two contiguous blocks are of equal heights, the differences of height being from one quarter of an inch to two inches; and further to obtain other irregularity of surface to the bed on which the crushing is performed, there are a number of grooves which are indicated by the red lines in fig. 2, and these are not at equal distances but vary, as will be seen on examining that figure of the drawing, but these grooves are not absolutely necessary, and I only use them when the blocks of which the bed is made, are of more than four inches square, by such an arrangement of blocks of wood, a bed or surface will be obtained on which the process of crushing New Zealand flax (*phormium tenax*), may be better performed than by any of the means heretofore practised. *d*, is a heavy grooved roller of granite or other suitable material, moving on an axis, *e*, such axis, *e*, passing through the upright shaft or axis, *f*, allowing of movement to the axis, *e*, which moves in suitable bearings at top and bottom, as is well understood by mill-wrights. *g*, is a bevelled toothed-wheel affixed on the shaft or axis, *f*; and *h*, is another bevelled toothed-wheel which takes into and drives the wheel, *g*, the wheel, *h*, being affixed on the shaft, *i*, which turns in suitable bearings, at *j, j*, as is shewn in the drawing, and motion is obtained to the shaft, *i*, by means of a band, *k*, drawn by a steam-engine or other power, all which will readily be understood on examining the drawing.

Having thus described the nature of the invention, I would have it understood, that I lay no claim to the machinery for actuating the crushing roller, and the same may be varied without departing from the invention; but what I claim is the mode of crushing or preparing New

Zealand flax (phormium tenax), by means of a bed or surface and suitable roller, as herein described.—In witness whereof, &c.

Enrolled June 17, 1839.

Specification of a Patent granted to JONATHAN FELL, of Workington, in the County of Cumberland, Ship Builder, for Improvements in Building Ships and other Vessels.—Sealed August 5, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said Jonathan Fell, do hereby declare the nature of my said invention and the manner in which the same is to be performed are fully described and ascertained in and by the following statement thereof (that is to say) :—

My invention relates to certain improved fastenings applicable to the securing the beams to the sides of ships and vessels. And in order to give the best information in my power, I will proceed to explain the drawing hereunto annexed, reference being had to the figures and letters marked thereon.

Description of the Drawing.

Fig. 1, represents the section of part of a ship or vessel's side; and

Fig. 2, is a plan of part of a ship or vessel, shewing two beams and parts of two sides of a ship or vessel, having my improvements applied thereto. I would, however, first remark that the ordinary mode of securing a ship's or other vessel's sides with the beams, is by means of knees placed under and at the sides of each beam on the inside of the ship or vessel. Now the object of my invention is to employ a mode of fixing more secure than what is afforded by the simple use of knees, and my mode of

securing the beams and sides of ships and vessels may be used conjointly with knees, or separately. The drawing shews my invention as applied conjointly with ordinary knees; under the beams, *a, a*, are two bolts to the ends of each beam, one on each side thereof, which pass through the outer planking through the timbers, and then they pass through two tubes, *b, b*, which I prefer to be of cast-iron; these tubes are cast with flat surfaces, *c* and *d*, the surfaces, *c*, resting against the side of the beams, *e*, and the flat end or surface, *d*, goes against the side of the ship or vessel, as is shewn in the drawing. The tubes, *b*, are fastened to the beams, *e*, by long spikes or bolts, *f*, driven through the plates, *c*, into the beams, or by other convenient means. The bolts, *a, a*, may be fastened by different ways, I usually make a screw at the end to receive a nut, by this means the sides of the ship may be more intimately drawn together, and when drawn together by the screwing up of the nuts, as at *g*, the end of the bolts may be hammered or rivetted down to prevent the nuts moving on the screws, but this is not absolutely necessary as the nuts being screwed up tightly may be left, or in place of there being screws on the bolts, *a*, the ends of the same may be simply rivetted down on a collar or washer, or a cotter may be driven through a suitable eye formed in the bolt, *a*.

The plan, fig. 2, shews these various means. I would remark, that it will be evident that no separation can take place between the sides of the vessel and the beams, unless the bolts, *a*, be broken, for they cannot be drawn through from the outside in consequence of the enlarged head of the bolt, *a*, and such bolts cannot be drawn from the tubes, *b*, in consequence of their being securely affixed by any convenient means; hence the sides of the vessel and the beams will be secured more completely than by the ordinary knees. *h*, are ordinary knees placed under the beams, and I have only to remark that such knees may be dispensed with, and then I should recommend the

using of another of my apparatus below each end of the beams.

Having thus described the nature of my invention, I would have it understood that what I claim is the mode above described of securing the sides and beams of ships and other vessels.—In witness whereof, &c.

Enrolled February 5, 1840.

Specification of the Patent granted to JOHN GEORGE SHUTTLEWORTH, of the Mount, near Sheffield, in the County of York, Soap Boiler, for a New Mode of Obtaining a Rotary Motion from the Rectilinear Motion of the Piston-Rod of a Steam or other the like Engine.—Sealed July 18, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said John George Shuttleworth, do hereby declare the nature of my said invention to consist in applying two rows of cogs and guide or steadying pins to an extension or elongation of that part of the piston-rod of a steam or other such engine, which, when the piston is down (if the cylinder be placed vertically), is above the top of the cylinder, and causing those two rows of cogs to act alternately upon segments of cogged-wheels, or a segment of a cogged-wheel, as the case may be, in such manner as to cause a continuous rotation of the axes or axis of the segments or segment aforesaid, which axes or axis may thereby be used as a driving-shaft or driving-shafts for machinery, without the intervention of any cranked-shaft. And in further compliance with the said proviso, I, the said John George Shuttleworth, do hereby describe the manner in which my said invention is to be performed by the following statement thereof, reference being had to the

drawing annexed and to the figures and letters marked thereon (that is to say) :—

Description of the Drawing.

Fig. 1, represents a front elevation of one application of my said invention, the piston to be considered as having just completed the up stroke, as shewn as commencing the descent of the down stroke. A, represents the cylinder of a steam-engine. B, the piston-rod, working as usual through a stuffing-box in the top of the cylinder. The part of the piston-rod, C, which is furnished with cogs never goes through the stuffing-box, but in all positions of the piston is above it. D, is a channel or groove in the piston-rod, working over a dove-tailed feather on the cross-bar, E, to steady it. F, G, are two segments of cogged-wheels, on the shafts of which are fixed the toothed gear-wheels, H, and I, taking into the carrier or communication toothed-wheel, K. When the piston-rod rises it is represented as carrying with it the segment, F, and when it descends it carries with it the segment, G, and, as whichever segment is acted upon by the piston-rod, causes by means of the communication-wheel, K, and the two gear-wheels, H, and I, the opposite segment to be brought round a continuous rotatory motion in one direction is given to each of the axes or shafts of the segments and toothed-wheels. In order more effectually to secure the release of one segment, and the biting or taking in at the same instant of the other, there is a contrivance-wheel, L, (see fig. 3) on the centre or communication-wheel, K. This contrivance consists of a raised groove or tappet, M, fixed on the face of the wheel, K, which takes a boss or steadying-pin, projecting from the piston-rod at N, alternately with one projecting from the rod at P, and thus secures the ascent of the rod sufficiently high in one case to fully release the segment, F, and catch the segment, G, and the descent of the rod sufficiently low in the other case to secure the full release

of the segment, *g*, and perfect catch of the segment, *r*. A fly-wheel, which may be placed on either of the three axes aforesaid, will also add its influence to effect this object and steady the motion of the engine.

Fig. 2, is a front elevation, shewing the piston-rod at half-stroke.

Fig. 4, represents another application of my said invention where only one segment is used, the aforesaid elongation of the piston-rod branching into two parts, *q*, *r*, and similar letters of reference being used to denote similar parts in all the figures, no further description will be required of this figure.

Now whereas I claim as my invention the application of cogged, gear, and steadying-pins, such as shewn in the apparatus herein before described, directly to the piston-rod of a steam or other the like engine, for the purpose of obtaining a rotatory motion for the driving-shaft from the rectilineal motion of the said piston-rod and without the intervention of a cranked-shaft. And such my invention being, to the best of my knowledge and belief, entirely new and never before used in that part of Her said Majesty's United Kingdom of Great Britain and Ireland called England, her said dominion of Wales or town of Berwick-upon-Tweed, I do hereby declare this to be my specification of the same, and that I do verily believe this my specification doth comply, in all respects, fully and without reserve or disguise, with the proviso in the said hereinbefore in part recited letters patent contained, wherefore I hereby claim to maintain exclusive right and privilege to my said invention.—In witness whereof, &c.

Enrolled February 8, 1840.

Specification of a Patent granted to EDWARD BROWN, of Lyme Regis, in the County of Dorset, Ironmonger, for Improvements in Apparatus for Cooking.—Sealed July 20, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said Edward Brown, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates, first, to improvements in the construction of kitchen ranges, and, secondly, to improvements in the construction of roasting jacks, which are acted on by means of air currents acting against the oblique vanes of a wheel. And in order to give the best information in my power, I will proceed to describe the drawing hereunto annexed in which the same letters of reference indicate similar parts wherever they occur.

Description of the Drawing.

Fig. 1, represents a front view of a range constructed according to my invention.

Fig. 2, is a transverse, and,

Fig. 3, a longitudinal section of fig. 1. A, is the fire-place, which I prefer to be lined with fire-brick, as is shewn in the drawing. B, are the fire-bars in front of the fire-place, and in front of such fire-bars, there is a grating, c; one portion of the bars thereof being fixed and the other moveable: hence one half of the bars, c, can be slid back and stand behind the other bars, c, and in such case the fire would be open in front, or by sliding the one half of the bars, c, so that they filled the spaces be-

tween the other half of the bars, the fire would be closed in front. *D*, is a hot plate to be used for the ordinary purposes for which hot plates are now used. *E*, is an opening having a cover, through which opening the fire is fed with fuel, and any species of fuel may be effectually used; and by removing the cover of the opening, *E*, a tea-kettle or other vessel may be set over the opening when desired. *F*, is the ash-drawer by which the ashes are removed, and by the extent to which this drawer is opened, the quantity of atmospheric air which passes to the lower part of the fire to support combustion is regulated. *G*, is a tube passing from the front of the range into the flue at the back of the range, the object of this tube will be hereafter described. *H*, is the oven, and it will be seen that the flue from the fire-place is so arranged, that it passes from one side of the fire-place over the oven, and then downwards under the boiler, *I*, and then upwards at the side of the boiler and into the chimney; and it will be found by this arrangement of flue, in respect to the oven, great advantages will be obtained in baking, as meat, pastry, &c., baked in this way will be destitute of the disagreeable flavour usually attendant on meat dressed in a common oven. *J*, is a hot closet, all which is clearly shewn in the drawing. *K*, is a door in order to allow of the upper part of the oven being cleaned; and *L*, is a door by which the flue below the boiler, *I*, can be cleaned out. The boiler may be arranged in any convenient manner for cooking or for keeping hot water, or partly for cooking and partly for hot water.

I will now describe the second part of my invention, which relates to a peculiar arrangement of jack and apparatus for roasting.

Fig. 4, representing a perspective view of this apparatus; and,

Fig. 5, a section thereof on a larger scale. *M*, is the external screen in which the joints, or other articles to be roasted are suspended. *N*, being a door by which the

cook can conveniently get at the inside of the screen, to examine the progress of the cooking. *o*, is an axis which revolves in bearings at *P*, *p*; and it should be stated that this apparatus may be arranged for roasting one or more joints or articles at one time, thus it will be seen that in fig. 4, three articles are being roasted at one time, and each article has its pan, which being carried by the revolving spindle, at all times retains its proper position under its joint or other article which is being roasted, and according to the arrangement at fig. 4, the spindle, *o*, rises vertically and has a wheel, *q*, affixed at the upper end, from which any number of hooks can be suspended, according to the number of joints or other articles to be roasted at one time; and at fig. 5, the revolving spindle is only arranged for cooking or roasting one joint, and it will be seen that there is only one plan, which is carried, by the revolving spindle, as is shewn. The mode by which motion is communicated to the spindle, is as follows: *r*, is a tube which is of a proper size to enter closely into the tube, *G*, of the range; the tube, *r*, is attached to the chamber, *s*, which is affixed at the bottom of the screen, and within this chamber the fly-wheel, *t*, works. This fly-wheel is similar to those of ordinary smoke jacks, the axis of which turns in bearings, at *v*, carried by the bars, *w*, which cross the chamber, *s*, and on the axis, *s*, is affixed a toothed pinion or worm, which takes into and drives the cog-wheels, *x*, the axis of which turns in bearings, at *y*, and on the axis of the wheel, *x*, is affixed a pinion or worm, which takes into and drives the cog-wheel, *z*, affixed to the spindle, *o*. This train of wheels and apparatus for carrying it being all arranged in a frame, such frame can be readily removed from the chamber, *s*, when required, and it will be seen that the lower part of this chamber is open, so as to admit the air to flow freely up through between the spokes or vanes of the fly-wheel, and thus give motion to the train of wheels, and consequently to the spindle, *o*, and the articles to be roasted. The upper part of the chamber, *s*, is covered by the cover, *s*. And

it will readily be understood, that if this apparatus be placed opposite the fire-place of the range, and the tube, *R*, inserted into the tube, *G* ; the air in such tubes will be heated by the fire, and by this means a quick and powerful draft will be caused towards the chimney, and thus keep up a constant rotary motion to the jack, and I would remark in respect to this part of my invention, that the apparatus of the jack may be varied so long as the mode of getting motion thereto be retained. And I would wish it to be understood, that I make no claim to the mode of arranging the train of wheels to reduce the high speed of the fly to a suitable speed for the spindle, *O*, when uncombined with the means of obtaining motion thereto, as herein described. And I would have it understood, that what I claim as my invention is, first, the mode herein described, of arranging the flue of the fire-place and oven of a range, as herein described.

Secondly, I claim the mode of applying a double grating to the front of a fire-place of a range, in order to such fire being used open or closed as desired, as above described.

Thirdly, I claim the mode of combining hot, plate oven, and hot chamber, heated by one fire, as above described.—In witness whereof, &c.

Enrolled January 20, 1840.

Specification of the Patent granted to DAVID NAPIER, of Millwall, in the County of Middlesex, Engineer, for Improvements in Iron Steam Boats.—Sealed April 23, 1839.

WITH AN ENGRAVING. ★

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said David Napier, do hereby declare the nature of

my improvements and the manner in which the same are to be performed, are particularly described and ascertained in and by the following description thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention consists in constructing iron steam-boats with double bottoms, also in applying the space between the bottoms for the purpose of condensing the steam from the engines without injection water.

Description of the Drawing.

The drawing represents a transverse section of an iron steamer on the above construction. A, the space between the two bottoms, B and C, which when used as a condenser requires another water-tight iron floor, D, about an inch and a half above C, into this inch-and-a-half space, there are openings in the bow and stern to allow the water to pass through, for the purpose of keeping, C, always cold. a, a, a, a, are plates of iron like keelsons, rivetted to B and C, for the double purpose of resisting the pressure and strengthening the vessel.

I do not mean to confine my invention to this particular form or construction, it consists in constructing iron steam boats with two water-tight bottoms of whatever shape or construction, also in applying the space between the bottoms for the purpose of condensing the steam from the engines. The advantages to be derived from this mode of constructing iron steam-boats are greater strength and safety, a saving of power in working the air-pump, and a saving in the wear and tear of the boilers, fresh water being always used, and the quantity remaining nearly always the same, accidents arising from want of water in the boilers can scarcely ever occur. In steamers of magnitude I would recommend the doubling to be continued up the sides.—In witness whereof, &c.

Enrolled October 22, 1839.

LAW REPORTS OF PATENT CASES.

*Court of Common Pleas, Westminster,
November 29, 1839.*

Before Lord Chief Justice TINDAL and a Special Jury.

GALLOWAY v. BLEADEN.

Mr. Attorney General.—May it please your lordship, gentlemen of the jury, I have the honour to represent before you one of the most ingenious and meritorious members of society, I mean Mr. Elijah Galloway; it is on account of his unwearied assiduity, that steam navigation has reached the pitch of perfection which we now witness. Gentlemen, you are of course aware that great inconvenience has been felt from the common paddle-wheels; and must have been a good deal annoyed by the vibration that you feel on board. What is the cause of that? It is, gentlemen, by the sudden immersion in the water of the paddle; the paddle being a continuation of the radius from the axis, this large body being at once immersed in the water there is a great shock, there is a great concussion and a great loss of power. When it becomes vertical it will do its duty, but as soon as it is leaving the water it produces the greatest inconvenience from the back water it lifts up; it thereby causes a very great resistance, and retards the progress of the vessel. Gentlemen, there have been various contrivances resorted to, for the purpose of overcoming these inconveniences, and Mr. Galloway invented a wheel which is now called Morgan's wheel, Mr. Morgan being the assignee of the patent which has been the subject of a trial at law, and the merits of which are universally acknowledged. Now the principle of that wheel is different entirely from the one you are going to sit in judgment on; it imitated the feathering of an oar; the paddle was still of one piece, which was made to enter the water at the favourable angle, then be-

come vertical when it was at the lowest point of immersion, and then it was so contrived, that, on leaving the water, it should assume another angle, and merely cut out of the water, without the resistance which had been experienced from the radial wheel. Gentlemen, this was found most successful, and the only objection was the fear that it might get out of order, and the difficulty there would be of repairing it when the vessel was at sea; it has been adopted by the steam vessels of the Royal Navy, and has been extremely successful. Now, gentlemen, to obviate this inconvenience, Mr. Galloway pursued his researches and followed up his discoveries, and the great object which he now had in view was to have a wheel which should be simple and solid, with only one motion from the axis of the wheel. There had been attempts made by several others to separate the paddle into sections, and to make it enter the water at different points; but these, gentlemen, had utterly failed because they were not so contrived as to make the different sections of the paddle enter at the same point of the water, and they were at a considerable distance from each other, so that these different sections did not operate as one float. The great problem was to have the sections of the float to come nearly to enter the water at the same point, and at no great distance from each other, so that they might operate as one; and then, gentlemen, that it should revolve, and leaving the water, that it should not at all offer the resistance which is opposed by the radial paddle, consisting of one continuous mass. Gentlemen, after many experiments, and a great deal of time spent, and very considerable expense incurred, Mr. Galloway did discover the curve upon which the different sections of this paddle should be placed to gain his true object: viz., entering the water at nearly the same places, and their not being so far distant, so that they might operate as one single float. Gentlemen, in the latter end of 1834, Mr. Galloway, had completed his experiments and wholly accomplished his

object ; in the latter end of that year, and in 1835, he communicated, confidentially, his discovery to several persons, and on the 18th August, 1835, he took out his patent, and the following month publicly put his invention into use. He was then a good deal surprised to hear that a gentleman of the name of Field claimed to have discovered this wheel ; but Mr. Field made no such wheels at that time, nor ever made such wheels until the year 1837 or 1838. But, gentlemen, there having been experiments made by Mr. Field,—abortive experiments made by Mr. Field, of which Galloway had notice before he enrolled his specification, he mentioned in that document those experiments, and clearly and satisfactorily distinguished his invention, from that of which it was said Mr. Field was the discoverer. Gentlemen, Mr. Galloway's paddle-wheel had the most brilliant success. Whatever experiments Mr. Field had made were abortive ; it was with him a total failure. But if he had made this discovery, which my client, Mr. Galloway, had made, it would have been just as successful in his hands, as it was in the hands of Mr. Galloway. Mr. Field is a gentlemen most extensively employed in fitting up steam-vessels,—he had the most ample opportunity of putting his wheels upon any vessels of which he had the fitting up, but he adhered to the old fashioned, entire, continuous, and radial paddle ; and until the year 1837, he did not think at all of making them in the manner by which the floats are divided into sections, on the principle of the wheel of Mr. Galloway. Gentlemen, the success of my client's wheel I say was brilliant ; as soon as it was shewn to the public, it was seen, from its simplicity, from its solidity, and from its efficiency, to be superior to any they had before known. It was adopted by most of the steam-packet companies ; it was adopted by some of the ships in Her Majesty's service, and by many private traders proceeding to different parts of the world, and, among others, gentlemen it was adopted by the Commercial Steam-Packet Company, who

are the defendants on this record, and are sued through their secretary, Mr. Bleadon. And I must say that they come with a very ill grace to defend this action, and to say they are entitled to pirate the invention of Mr. Galloway, when they themselves again and again purchased from him his patent wheels, and paid him for a licence to allow them to have another pair of wheels made upon his principle, where it was not convenient for him to fit them up. Now, gentlemen, I say that having got our wheels manufactured by us, they having acknowledged to us that this was a valid patent, having had their vessels fitted up with this patent, I do think it is not quite correct for them to go to another person who makes these wheels, perhaps a little cheaper,--he pirating our invention, and then say they will give nothing for a licence, because they allege that the patent is void. Gentlemen, Messrs. Routledge and Galloway went on successfully during 1836 and 1837, and then there was a certain degree of envy at the success which they enjoyed, and others claimed to make this wheel exactly according to the specification, and said that they would set Mr. Galloway at defiance. Amongst others I am sorry to say, we must innumerate the Commercial Steam-Packet Company; this action is brought against them rather than against Mr. Field, we might easily have brought an action against him, because it is notorious that he, upon our principle, has fitted up the Great Western, the exploits of which are celebrated all over the world, but it was thought a fairer proceeding, that this action should be brought in such a shape as to allow Mr. Field himself to be called as a witness, and I may say a witness in his own cause. Well, then, what is the defence? Gentlemen, it is said, I think, there are two defences: one is that Mr. Golloway was not the inventor, and that Mr. Field was the inventor of it, of it previously; and secondly, that the specification is not sufficient. Gentlemen, it is not at all disputed that before any experiments were made, either by Mr. Galloway or

Mr. Field, the notion had been entertained of dividing the float-board into sections; that had been tried, but the mode of doing it efficiently had never been discovered, because merely to divide the float-board with sections,—to make each section as it were, a separate float-board, will retard rather, than accelerate, the motion of the vessel. It is said that in 1833, Mr. Field shewed a wheel to the Lords of the Admiralty. Gentlemen, it will not be very material to consider what that wheel was, because the shewing of it to the Lords of the Admiralty was no publication—was no general practice of the invention, and would not deprive a person who subsequently made the same discovery from taking out a patent for it. But, gentlemen, I very much believe at that time that Mr. Field knew nothing of the principles, upon which Mr. Galloway's wheel is constructed. In that year Mr. Field fitted up a steamer, called the *Endeavour*, by way of experiment, the paddle-wheel of which had the float-boards separated into sections, but those sections were not upon the curve described by Mr. Galloway; that the curved line upon which the sections were fixed was not a cycloid; that the different sections did not enter the water at the same place, and that they were at such a distance from each other that they did not operate as one float, and the best proof that the trial was a failure, was the fact that Mr. Field had the wheel removed, and the *Endeavour* was again navigated by the old fashioned radial paddle-wheel. Gentlemen, if the invention had been constructed on the principle of Mr. Galloway's wheel, and the experiment had been successful, Mr. Field would immediately have taken a patent, he would have secured this most valuable invention, but instead of that he drops it entirely and from that time until the year, 1837, he never fitted up a single vessel on a similar principle. Now, gentlemen, I think that, in all these cases, juries may adopt this as a safe test and criterion,—Who brought this discovery to perfection? Who made it efficient for the public service?

Mr. Field failed, and if Mr. Galloway had not taken up subject,—if he had not made his experiments,—if he had not prosecuted his enquiries, the wheel that is now adopted by the Great Western, the British Queen, and other steamers, would never have been brought into use. Gentlemen, the second objection in the validity of the patent, is that the specification is not sufficient to instruct a workman to make the wheel ; I shall shew that any workman, of competent skill, by merely having the specification laid before him, and who is in the habit of making paddle-wheels, can do it without the smallest difficulty. Well then we have no dispute about infringement, and the only question I apprehend will be whether Mr. Field was the inventor, and publicly practised the invention before the 18th of August, 1835. Gentlemen, with this observation I will now content myself ; I will call my witnesses, and I trust that this patent will be established, and that this discovery which has been so beneficial to the public, may likewise be beneficial to the ingenious gentleman who is the author of it.

William Carpmael, civil engineer, sworn, examined by *Mr. Attorney General*. Has known Mr. Galloway ten or twelve years, during which time he has frequently consulted me upon his inventions. He shewed me a model, and described the general principle upon which he proposed to construct the wheel which is the subject of the present trial. Either the latter end of 1834 or beginning of 1835 : I have been very much consulted upon the subject of paddles, I should say that almost every experiment that has been made on paddle-wheels have come to me, in some shape or other. As far as I know the principle of Mr. Galloway's invention, it was new at the time of his taking out his patent. There has always been great inconvenience experienced in using paddle-wheels with the radial floats being one continuous substance ; each float-board gives a blow as it enters the water, and causes great concussion and vibration, and the power that is required to

force the paddles into the water is prejudicial to the engine. The object of all modern improvements has been to get rid of that loss of power, and also to get rid of the shocks. There is a loss of power on leaving the water, in proportion to the approach of the float to the horizontal position, or sharpness of the angle at which it comes out, according to the circumstances under which the ship is labouring. In my opinion Mr. Galloway's wheel is calculated to obviate these difficulties; the principle upon which this wheel is constructed is this,—supposing a wheel is passing along a level surface, a point in that wheel generates a certain curve, which is called a cycloid, and the patentee claims the affixing of the different portions of which a float-board consists, upon a cycloid, with the view that they should follow in that same cycloid, and consequently follow each other, so that any one of the parts of a float-board having entered the water, the next part thereof would follow in the same curve. Notwithstanding the onward motion of the wheel and the space between each of the parts, owing to the space between them being so small, the quantity of water that could by possibility slip through would be very trifling, and they would substantially act as a solid float-board. With respect to the wheel of the Endeavour, supposing it to have been upon the cycloidal curve, it would not be within the boundary line pointed out by Mr. Galloway. The former, so far as I have been able to porture and turn it about in every shape and form, appears to me to be upon no cycloidal line at all. The parts of a float-board on the wheel of the Endeavour, would not enter the water at the same place; there would be a very considerable separation between them, and in a large wheel, for instance if it was on the Great Western, I should think the points of entering the water of the separate parts of a float-board, would be as far apart as two feet, or even more, the effect would be the reverse of Mr. Galloway's wheels, the first float-board would break up the water,

and the second would follow into that broken water, and the third into that. There is not, nor could be at any one time, any thing like a perpendicular position of all the parts of a float-board; one part must have proceeded according to the distance of one from the other, which is very considerable. A wheel upon this construction would not get rid of the shock sufficiently, and I think it would work worse than the common radial float. The wheels of the *Grand Turk* and the *Chieftain* are constructed upon the principles of Mr. Galloway's invention. [The witness was speaking to two models of the defendant's wheels, on the vessels of the Company called the *Chieftain* and the *Grand Turk*.] The specification is so drawn that no person could fail to make wheels according to the specification.

The witness was cross-examined by *Mr. M. D. Hill*, but did not vary the substance of the evidence. Much of the evidence is necessarily left out, owing to the witness speaking of various models and diagrams to illustrate the subject, which cannot be given, and would not be intelligible, unless our readers had the models and diagrams before them.

George Cottam, Engineer, examined by *Mr. Attorney-General*.—I have examined the construction of the wheel that is the subject of Mr. Galloway's patent, which I believe was quite new at the time the patent was taken out. It differs from the ordinary radial wheel by the floats being divided and arranged in a cycloidal curve. There are great advantages resulting from the use of such a wheel, the violent shocks that the common radial paddle subjects the vessel to, are greatly reduced. It enables a vessel to be more deeply laden, with less injury to her speed than with common radial floats. It prevents her from having so much loss from what is called tail-water; the pieces of the float-board should all be within such a space apart, that they shall act in concert with each other; all to be nearly vertical when at the greatest propelling point, that

is when vertical or a little beyond. If they are so far apart that they will not act in concert, there is little or no saving of power. A wheel constructed upon the principle of that used in the Endeavour would not be any improvement upon the common radial wheel. I have carefully examined Mr. Galloway's specification, upon reading which no competent workman could find the slightest difficulty in constructing the wheel. [This witness also spoke to the same models and diagrams as the previous witness.]

Cross-examined by *Mr. Hill*.—It is not necessary that the floats should be arranged on the cycloidal curve, any curve coinciding as nearly as possible with the cycloid will do, there are half a dozen curves that would do, there is the involute, the evolute of a circle, and the volute.

Joseph Gibbs sworn.—Examined by *Mr. Richards*.—I am Engineer of the Croydon railway; I have frequently been on board vessels that have used Mr. Galloway's paddles; the difference between those and boats propelled by the ordinary wheel is very great. The motion of the vessel, in its progress through the water, is much softer, in the one case there was a distinct blow of the paddle, and in the other case it was more equal and uniform. Mr. Galloway communicated this invention to me in the latter part of 1834. He shewed me the model, and also a drawing and diagram of his paddle-wheel, and he gave me the reasons for adopting it, and those reasons are precisely the same as those contained in the specification of the patent.

Mr. Attorney-General.—My Lord, this is the plaintiff's case.

(To be concluded in our next.)

NOTICE OF EXPIRED PATENTS.

(Continued from p. 168.)

RICHARD EVANS, of Bread Street and Queen Street, Cheapside, Coffee Merchant, for improvements in the apparatus for and process of distillation.—Sealed January 7, 1826.—(*For copy of specification see Repertory, Vol. 3, third series, p. 208.*)

HENRY HOULDSWORTH, the younger, of Manchester, Cotton Spinner, for improvements in machinery for giving the taking-up or winding on motion to spools or bobbins and tubes, or other instruments, on which the roving or thread is roving, spinning, and twisting machines.—Sealed January 16, 1826.

BENJAMIN NEWMARCH, of Cheltenham, Esquire, for an improved method of exploding fire-arms.—Sealed January 16, 1826.—(*For account of specification, see Repertory, Vol. 3, third series, p. 424.*)

JOHN ROTHWELL, of Manchester, Tape Manufacturer, for improved heald or harness for weaving purposes.—Sealed January 16, 1826.

HENRY ANTHONY KOYMANS, of Warnford Court, Throgmorton Street, London, Merchant, for improvements in the construction and use of apparatus and works for inland navigation. Communicated by a foreigner residing abroad.—Sealed January 16, 1826.—(*For account of specification, see Repertory, Vol. 3, third series, p. 313.*)

JOHN FREDERICK SMITH, of Dunston Hall, Chesterfield, Esquire, for an improvement in the process of drawing, roving, spinning, and doubling, wool, cotton, and other fibrous substances.—Sealed January 19, 1826.

WILLIAM WHITFIELD, of Birmingham, for improvements in making or manufacturing of handles for saucepans, kettles, and other culinary vessels, and also tea-kettle handle straps, and other articles.—Sealed January 19, 1826.

BENJAMIN COOK, of Birmingham, Brass Founder, for improvements in making or constructing hinges of various descriptions.—Sealed January 19, 1826.

ABRAHAM ROBERT LEORENT, of Gottenburg, Merchant, at present residing in King Street, Cheapside, London, for a method of applying steam, without pressure, to pans, boilers, coppers, stills, pipes, and machinery, in order to produce, transmit, and regulate various temperatures of heat in the several processes of boiling, distilling, evaporating, inspissating, drying, and warming, and also to produce power.—Sealed January 19, 1826.—(*For account of specification, see Repertory, Vol. 3, third series, p. 408.*)

SIR ROBERT SEPPINGS, Knight, of Somerset House, London, for an improved construction of such masts and bowsprits as are gene-
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rally known by the name of made masts and made bowsprits.—Sealed January 19, 1826.—(*For account of specification, see Repertory, Vol. 2, third series, p. 331.*)

ROBERT STEPHENSON, of Bridge Town, Warwickshire, Engineer, for axletrees to remedy the extra friction on curves to waggons, carts, cars, and carriages used or to be used on railroads, tramways, and other public roads.—Sealed January 23, 1826.—(*For account of specification, see Repertory, Vol. 4, third series, p. 365.*)

ROBERT RIGG, of Bowstead Hill, Cumberland, Gentleman, for a new condensing apparatus, to be used with, or applied to, the apparatus now in use for making vinegar.—Sealed February 4, 1826.

JOSIAH CHRISTOPHER GAMBLE, of Dublin, Chemist, for an apparatus for the concentration and crystallization of aluminous and other saline and crystallizable solutions, part of which apparatus may be applied to the general purposes of evaporation, distillation, inspissation, and desiccation, and especially to the generation of steam.—Sealed February 7, 1826.—(*For copy of specification, see Repertory, Vol. 3, third series, p. 5.*)

WILLIAM MAYHEW, of Union Street, Southwark, and WILLIAM WHITE, of Cheapside, London, Hat Manufacturer, for an improvement in the manufacture of hats.—Sealed February 7, 1826.—(*For copy of specification, see Repertory, Vol. 5, third series, p. 65.*)

(*To be continued.*)

LIST OF NEW PATENTS.

JAMES BEAUMONT NEILSON, of Glasgow, Gentlemen, for certain improved methods of coating iron under various circumstances, to prevent oxidation or corrosion, and for other purposes.—Sealed February 29, 1840.—(*Six months.*)

ROWLAND MACDONALD STEPHENSON, of Upper Thames Street, Civil Engineer, for an improved method or methods of adjusting, shifting, and working theatrical scenery and apparatus.—Sealed February 29, 1840.—(*Six months.*)

RICHARD EDWARDS, of Fairfield Place, Bow, Dealer in Emery Cloth, for improvements in preparing and com-

bining of materials used in lighting or kindling fires.—Sealed February 29, 1840.—(*Six months.*)

JOHN SYLVESTER, of Great Russell Street, Engineer, for improvements in the construction of doors and frames for closing the openings of fire places, ash pits, flues, chimneys, and certain retorts.—Sealed March 3, 1840.—(*Six months.*)

JOSEPH SHORE, of Birmingham, Merchant, for improvements in preserving and covering certain metals and alloys of metals.—Sealed March 3, 1840.—(*Six months.*)

JAMES HORNE, of Clapham Common, Esquire, for improvements in the stuffing-boxes of lift pumps.—Sealed March 3, 1840.—(*Six months.*)

JOSEPH CLISILD DANIELL, of Limpley Stoke, Bradford, in the county of Wilts, for an improved method of preparing shoot or weft to be used in weaving woollen cloth and cloths made of wool and other materials.—Sealed March 3, 1840.—(*Six months.*)

JOHN RANGELEY, of Camberwell, Gentleman, for improvements in the construction of railways, and in the means of applying power to propelling carriages and machinery.—Sealed March 3, 1840.—(*Six months.*)

WILLIAM CRAIG, of Glasgow, Engineer, and WILLIAM DOUGLAS SHARP, of Stanley Perthshire, Engineer, for certain improvements in machinery for preparing, spinning, and doubling cotton, flax, wool, and other fibrous substances.—Sealed March 3, 1840.—(*Six months.*)

JOSEPH NEWTON, of High Bridge Mill, York, Manufacturer of Fancy Cloths, and GEORGE COLLIER, of the same place, Mechanic, for an improvement in looms, for the weaving of figured or twilled fabrics.—Sealed March 4, 1840.—(*Six months.*)

JOSEPH BOWER, of Hunslet, York, Soda Ash Manufacturer, for certain improvement in the manufacture of carbonate of soda.—Sealed March 4, 1840.—(*Six months.*)

CHARLES ALEXANDER PELLERIN, of Leicester Square, Gentleman, for improvements in wind and stringed musical instruments. Communicated by a foreigner residing abroad.—Sealed March 4, 1840.—(*Six months.*)

CHARLES KOBER, of Leadenhall Street, Cloth Manufacturer, for improvements in fixing colour in cloth.—Sealed March 7, 1840.—(*Six months.*)

CAROLINE JULIA SOPHIA COX, of Addison Road, Kensington, Spinster, for an improved mode of fastening and uniting the edges of the divided parts of shoes, boots, bandages, packages, and other articles of dress or utility.—Sealed March 7, 1840.—(*Two months.*)

JOSEPH ATKINSON, of Roundhill, York, Farmer, for improvements in thrashing and winnowing-machine.—Sealed March, 7, 1840.—(*Six months.*)

ROBERT MOLYNEUX, of Southampton Row, Chronometer Maker, for an improvement or improvements in chronometers.—Sealed March, 7, 1840.—(*Six months.*)

WILLIAM MALTLBY, Junior, of Mile End, Chemist, and RICHARD CUERTON, Junior, of Percy Street, Brass Founder, for improvements in extracting and concentrating the colour, tanning, and other matter contained in vegetable and animal substances.—Sealed March 7, 1840.—(*Six months.*)

LUKE HEBERT, of Birmingham, Civil Engineer, for improvements in the manufacture of cofered spades and shovels, soughing and grafting tools, and other implements of a like nature.—Sealed March 7, 1840.—(*Six months.*)

HAYWARD TYLER, of Milton Street, Cripplegate, Engineer, for certain improvements in machinery or apparatus for impregnating liquids with gas, including bottles for retaining, keeping, and preserving liquids so impregnated, also in the manner of filling and closing such bottles.—Sealed March 7, 1840.—(*Six months.*)

JAMES KNOWLES, of Little Bolton, Lancaster, Coal

Merchant, for an improved arrangement of apparatus for regulating the supply of water to steam-boilers.—Sealed March 10, 1840.—(*Four months.*)

GEORGE GWYNNE, of Portland Terrace, Regent's Park, Gentleman, for improvements in the manufacture of candles, and in operating upon oils and fats.—Sealed March 10, 1840.—(*Six months.*)

WILLIAM FORRESTER, of Barrhead Renfrew, Manager, for certain improvements in sizing, starching, dressing, and otherwise preparing warps for weaving fabrics, and on the machinery and apparatus therewith connected.—Sealed March 11, 1840.—(*Six months.*)

THOMAS PEEL, of Bread Street, Cheapside, Gentleman, for certain improvements in steam-engines. Communicated by a foreigner residing abroad.—Sealed March 11, 1840.—(*Six months.*)

RICHARD SMITH and RICHARD HACKING, of Bury, Lancaster, Machine Makers, for certain improvements in machinery and apparatus for drawing, slubbing, roving, and spinning cotton, wool, flax, silk, and other fibrous substances.—Sealed March 13, 1840.—(*Six months.*)

ETIENNE ROBERT GAUBERT, of Paris, Professor of Mathematics, for certain improvements in machinery or apparatus for distributing types or other typographical characters into proper receptacles, and placing the same in order for setting up after being used in printing.—Sealed March 13, 1840.—(*Six months.*)

JAMES HADDEN YOUNG, of Lille, in the kingdom of France, and ADRIEN DELCOMBE, of Lille aforesaid, for an improved mode of setting up printing types.—Sealed March 13, 1840.—(*Six months.*)

ROBERT VARICAS, of Burton Crescent, Surgeon, for improvements in rendering fabrics and leather waterproof.—Sealed March 16, 1840.—(*Six months.*)

WILLIAM CROFTS, of Radford, Nottingham, Machine Maker, for improvements in machinery for the purpose of making figured or ornamental bobbin net or twist lace,

and other ornamental fabrics, looped or woven.—Sealed March 16, 1840.—(*Six months.*)

JEAN FRANCOIS VICTOR FABIEN, of King William Street, London, for improvements in rotary engines to be worked by steam or other fluids.—Sealed March 16, 1840.—(*Six months.*)

THOMAS CRADDOCK, of Broadheath, Radnor, Farmer, for a certain improvement or improvements in steam-engines and steam-boilers.—Sealed March 16, 1840.—(*Six months.*)

RICHARD SMITH and RICHARD HACKING, of Bury, Lancaster, Machine Makers, for certain improvements in machinery for spinning cotton and other fibrous substances.—Sealed March 16, 1840.—(*Six months.*)

ISHAM BAGGS, of Cheltenham, Gentleman, for improvements in engraving, which improvements are applicable to lithography.—Sealed March 17, 1840.—(*Six months.*)

MOSES POOLE, of Lincoln's Inn, Gentleman, for improvements in producing and preparing leys for soap making, and in the manufacture of soap. Communicated by a foreigner residing abroad.—Sealed March 17, 1840.—(*Six months.*)

SAMUEL SEAWARD, of the Canal Iron Works, Poplar, Engineer, for certain improvements in the construction of steam-engines and in the application of steam-engines to propelling ships and other vessels.—Sealed March 17, 1840.—(*Six months.*)

SIR WILLIAM BURNETT, Knight, of Somerset House, for improvements in preserving animal, woollen, and other fibrous substances from decay.—Sealed March 19, 1840.—(*Six months.*)

JOHN JACKSON, of Manchester, Nail and Bolt Manufacturer, for certain improvements in the manufacture of nails, nuts, bolts, and rivets.—Sealed March 19, 1840.—(*Six months.*)

THOMAS STIRLING, of Limehouse, Patentee of the

“rapid filterer” for improvements in the manufacture of fuel.—Sealed March 20, 1840.—(*Six months.*)

FRANCIS WILLIAM GERISH, of East Road, City Road, Patent Hinge Maker, for improvements in locks and keys and other fastenings for doors, drawers, and other such purposes.—Sealed March 20, 1840.—(*Six months.*)

CHARLES KEENE, of Sussex Place, Regent’s Park, Gentleman, for improvements in producing surfaces on leather and fabrics. Communicated by a foreigner residing abroad.—Sealed March 23, 1840.—(*Six months.*)

WILLIAM NEWTON, of Chancery Lane, Civil Engineer, for certain improvements in the strengthening and preserving of ligneous and textile substances. Communicated by a foreigner residing abroad.—Sealed March 23, 1840.—(*Six months.*)

SAMUEL HILL, of Sloane Street, Chelsea, Gentleman, for improvements in the making of bread and biscuits.—Sealed March 25, 1840.—(*Six months.*)

ELHANAN BICKNELL, of Newington Butts, Surrey, Merchant, for improvements in separating the solid from the liquid parts of tallow, and other fatty matters. Communicated by a foreigner residing abroad.—Sealed March 25, 1840.—(*Six months.*)

WILLIAM PALMER, of Sutton Street, Clerkenwell, for improvements in the manufacture of candles, and in apparatus for applying light.—Sealed March 25, 1840.—(*Six months.*)

HENRY SMITH, of Birmingham, Lamp Manufacturer, for improvements in gas burners, and in lamps.—Sealed March 25, 1840.—(*Six months.*)

GEORGE RICHARDS ELKINGTON and HENRY ELKINGTON, of Birmingham, for improvements in coating, covering, or plating certain metals.—Sealed March 25, 1840.—(*Six months.*)

JOSEPH CROSFIELD, of Warrington, Soap Maker, for certain improvements in the manufacture of plate glass.—March 25, 1840.—(*Six months.*)

SAMUEL KNIGHT, of Woodhouse Mills, Lancaster, Bleacher, for certain improvements in machinery or apparatus for boiling, bleaching, or scouring, for the purpose of preparing and assisting the process of bleaching and dyeing cotton and linen, and other fabrics and fibrous substances.—Sealed March 25, 1840.—(*Six months.*)

JAMES HAY, of Belton, Haddington, Scotland, Captain in the Royal Navy, for an improved plough, which he entitles the Belton plough.—Sealed March 25, 1840.—(*Six months.*)

HENRY PHILIP ROUQUETTE, of Norfolk Street, Strand, Merchant, for a new pigment. Communicated by a foreigner residing abroad.—Sealed March 25, 1840.—(*Four months.*)

JAMES SABBERTON, of Great Pultney Street, Golden Square, Tailor, for a fastening to attach straps to the bottoms of trousers.—Sealed March 26, 1840.—(*Two months.*)

ALEXANDER SOUTHWOOD STOCKER, of Birmingham, Manufacturer, for certain improvements in manufacturing tubing or tubes, which are applicable to gas and other purposes.—Sealed March 27, 1840.—(*Six months.*)

RICHARD PROSSER, of Cherry Street, Birmingham, Civil Engineer, for certain improvements in machinery or apparatus for manufacturing pipes.—Sealed March 27, 1840.—(*Six months.*)

HENRY KIRK, of Upper Norton Street, Portland Place, Merchant, for improvements in the application of a substance or composition as a substitute for ice for skating and sliding purposes, part of which improvements may also be employed in the manufacture of ornamental slabs and mouldings.—Sealed March 28, 1840.—(*Six months.*)

JOHN BETHELL, of St. John's Hill, Wandsworth, Gentleman, for improvements in treating and preparing certain oils and fatty matters.—Sealed March 28, 1840.—(*Six months.*)

THE
REPERTORY
OF
PATENT INVENTIONS.

No. LXXVII. NEW SERIES.—MAY, 1840.

Specification of the Patent granted to ADOLPHUS HENRI ERNESTE RAGON, of Middlesex, Professor of Literature, for Improvements in the Manufacture of Glass, and in the Production of other Vitreous Matters applicable to Architectural Purposes.—Sealed November 3, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Adolphus Henri Erneste Ragon, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained, in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The invention relates, first, to a mode of purifying sand or siliceous substances or compounds of silica used in glass making, previous to their entering into the composition of glass, so that, when the other materials are likewise carefully purified by any of the known processes, and fused together in the common way, they will at once give a pure and colourless glass; thus avoiding the necessity of neu-

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tralizing the colour by the addition of various materials, as has been heretofore practised.

Secondly, to a mode of casting, forming, or producing plates of glass direct from the melting-pot, flatter, smoother, and of a truer surface, than by the methods now in use.

Thirdly, to a modification of the furnace used in the manufacture of glass, so as better to protect the metal in the pots during fusion from accidental impurities, and for better regulating the heat.

Fourthly, to improvements in the process of annealing, whereby the heat of the melting furnace is made to anneal the glass before it is allowed to pass off up the chimney ; and,

Lastly, to applying to useful architectural purposes the waste slag of smelting furnaces.

Having thus pointed out the objects of the invention, I will proceed to describe how the same is to be performed. The first improvement for purifying siliceous substances, or compounds of silica, consists in bringing the siliceous matter into an aqueous solution, by which I am enabled to remove any iron or other impurities found therein, thus obtaining more pure silica, previous to its being mixed with the alkali and other materials to form glass, into solution. But I would remark, first, that silica may be brought into aqueous solution in various ways. I do not, therefore, confine myself to any particular mode; but I believe the following most suited for the purpose: take about equal parts of sulphuric acid and fluor spar, and nearly the same quantity of silica, mix them together in a retort, which I prefer to be of lead, expose the same to the action of a moderate heat, taking care not to let the heat be so high as to injure the lead; fluosilicic-acid gas will thus be obtained, which, passed into water, will deposit pure silica; and which is to be separated by filtration, or any other convenient mode. To the remaining liquid, which is hydro fluosilicic-acid, add a solution of muriate of soda (about 60 parts to 41 of the liquid), and which, when evaporated to dryness, will give a fluosilicate of soda. This

may be used as one of the materials in the formation of glass; or in place of the above method, I can take sand or any siliceous substance, and alkali or common soda; of the former, one part to three parts of the latter; calcine them together in a crucible at a moderate red heat; dissolve the fused mass in water; separate by filtration, or draw off the clear supernatant liquor from the insoluble impurities, and evaporate it to dryness. The product left will be silicate of soda, or the silica may be thrown down by the addition of lime, or lime-water, whereby you are able to obtain pure silica, either in a free state, or combined with soda. The two methods combined give a cheap material.

I will now proceed to describe the second part of the invention, which consists in casting the fluid glass on a polished metal table, in the customary way; but instead of passing a roller over the fused metal to force it into a flattened plate, I bring another flat plate or surface upon the melted glass, so as to compress it into a sheet, the thickness and dimensions of which are determined by strips or sides to the table, which prevent the upper plate descending too low down. Thus, by keeping the top plate pressing upon the surface of the glass until it has solidified, a much truer surface, or better plane, is obtained than by merely passing a roller over the glass, as is the common practice, and consequently much less grinding is required to get a true surface. But when the mass of fluid glass is too great to be controlled by the weight or pressure of the top plate or surface; in that case the latter is made to travel in grooves introduced in the side of the table, and should immediately follow, and simultaneously move, with the roller now in use, the object being always to confine or compress the glass until solidified, as above explained, and thus prevent the warping of the glass-plates when exposed too promptly to the action of the atmosphere. These mechanical means are too well understood to render any further description necessary.

The modification of the furnace consists in placing the pots so that they may be less exposed to the sulphurous dust, and other impurities of the fuel, and the heat better regulated. This part of the invention will be best understood by referring to the drawing.

Description of the Drawing.

A, the furnace, which is to be air-tight.

B, the close ash-pit, into which a blast of air is driven at any given pressure, so as to obtain the degree of heat required.

C, the hot chamber in which the crucibles are placed.

D, the level of the burning fuel.

E, a close feeding hopper.

F, the flue to convey the hot-air into the arch of the annealing oven.

I will now describe the improvement of the annealing oven, which will also be best understood by referring to the drawing. *a*, is a revolving table in polished fire tiles, Stourbridge clay, or any other suitable materials, fixed on a cast-iron base. The table is supported by and moved on wheels, running in a circular tram way or trench. *b*, the centre or axis on which it revolves. *c*, the dome or top of the arch or oven, made of fire-brick, which is stationary, and is fixed over the table, *a*. *d*, the hot air-flue, to correspond with the flue, *f*, of the furnace. *e*, the escape pipe for the cooled air. The descending or turned down edge or rim of the moveable table on which the glass is placed, enters into a hollow channel containing sand, so that they may work one within the other, the vacant space being filled up with sand, to prevent the hot air from escaping. Supposing the glass to require fifteen days to anneal, then the table must be moved on its axis one fifteenth part of the circumference every twenty-four hours, in order that the glass, which is first introduced in the hottest part of the annealing oven, immediately under the opening or flue, *d*, may be withdrawn at the coolest

part on the fifteenth day. This fifteenth part (or any other computed division of the table, corresponding with the number of days allowed for annealing,) is then moved forward, under the flue, *d*, to get sufficiently heated to receive fresh glass, and thus a continued supply is kept up; by this means a great saving in fuel is effected, since all the heat from the melting furnace is made available to anneal the glass. The arch or dome is made as thin as possible, and covered with sand, so that by increasing or diminishing the bed, the radiation of heat may be prevented or effected at any part of the flue or annealing places, as occasion may require.

Lastly, the mode of carrying out the improvement for applying to architectural purposes the vitreous slag of the furnace used for smelting ores, consists in receiving this refuse flux or scoria, as it flows in a fluid state from the furnace, into moulds, of which the figure, size, and shape, of course determine the figure, size, and shape of the casting. Either the bottom of the mould, or the top plate which serves as a stamp thereto, or both of them, may be provided with any given figure, pattern, or device, for the purpose of stamping or imprinting the cast vitrified material. The slag lumps from the smelting furnace, by the practice now in common use, are removed at very considerable expense, on railway trucks, to the slag heap, as waste material, or serve merely as gross matter to mend the roads, or are coarsely piled together for walls and sheds, or other coarse buildings.

Having thus described the nature of the invention, I would have it understood that what I claim as the invention secured by the present letters patent is, first, the improvement of glass making, by employing siliceous substances, previously brought into solution, so as to be purified previous to its entering into the composition of glass.

Secondly, I claim the mode of making sheets of glass, as herein described.

Thirdly, The mode of arranging or constructing of the furnace, by which the glass is less subjected to become injured, during the process of fusion, as herein described.

Fourthly, I claim the arrangement of annealing oven, as herein described; and

Lastly, I claim the converting, by casting, the vitreous slag into regular and systematic shapes, as applicable to architectural purposes, particularly designed for monuments, and other species of ornamental architecture.—In witness whereof, &c.

Enrolled May 3, 1839.

Specification of the Patent granted to JOB CUTLER, of Lady Poole Lane, Spark Brook, Aston juxta Birmingham, in the County of Warwick, Gentleman, for an Improved Method or Methods of Constructing Chains for Suspension Bridges, Cables, Mining, and other purposes, and for an Improved Method of Making the Bars, Links, and Bolts thereof.—Sealed March 12, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said Job Cutler, do hereby declare the nature of my said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hercunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates, first, to certain novel constructions of wrought-iron chains, wherein the parts are so formed and combined as to offer greater security, and chains so constructed are less liable to fracture and derangement than the various wrought and other iron chains heretofore constructed.

Secondly, the invention relates to the means of forming the links, bars, and bolts of such novel construction of chains. And in order to give the best information in my power, I will proceed to describe the drawing hereunto annexed, in which the same letters of reference are used to indicate similar parts wherever they occur.

Description of the Drawing.

Fig. 1, represents a plan of part of a chain constructed and combined according to my invention.

Fig. 2, is an edge view of fig. 1 ; and,

Figs. 3 and 4, shew separate parts of such chain. The principle on which this chain is constructed is such that one set of bars, links, or bolts, have circular, by preference cylindrical, projections formed thereon, and the other set of bars, links, or bolts, have corresponding circular, and by preference cylindrical, sockets or cavities formed therein, so that when a projection of one bar enters a socket or cavity of another bar, the one shall correctly fit the other, yet allow of the projection turning in the socket or cavity; and in addition to such sockets and projections there are to be holes formed through the bars passing through the centre of each cylindrical projection, and also through the cavities or sockets, through which a pin is passed; hence when any number of pairs of links, bars, or bolts are combined together, they will each and all be capable of movement on the pin; and further, each bar or link with a socket will be capable of movement on circular projections, and the bars or links with projections will be capable of movement in their respective sockets, all which will readily be understood on a careful examination of the drawing, aided by the following explanation thereof. *a, a*, represents the outside bars, links, or bolts of the chain, they have each hollow cylindrical projections, *b, b*, as is already shewn in the drawing. *c, c*, are the minor links, bars, or bolts, which have each four cylindrical projections, *b*, two at each end, but on opposite

sides of the bars. d, d, d , are links, bolts, or bars, each having four cylindrical cavities or sockets, b^1 , to receive the projections, b , of the bars, a, c . It will be seen that there are four bars, bolts, or links, a, c , to three of the links, bolts, or bars, d , consequently in order to make all parts of the chain equally strong, or as nearly so as possible, the three bolts, bars, or links, d , should be each somewhat stronger than a bar, bolt, or link, a, c . The two sets of bars, bolts, or links, are combined together by means of the wrought-iron pin, e , which is passed through the holes formed through the centres of the cylindric projections, and through the holes in the sockets. The pins, e , may be fastened by rivetting, or by having a head at one end, and screw and nut at the other. f, g , are pins which pass through the links, bars, or bolts, a, c , and d , by which the parts are more closely combined, and offer a means of holding the chain together, even though a pin, e , should be broken or fall out; for it will be evident that the sockets and projections being retained together by the pins, f, g , the chain would work safely; but I consider the pins, e , should at all times be employed, though the pins, f and g , may be dispensed with when desired, and when used they may be rivetted, or have screws or nuts, as shewn.

Fig. 5, shews a plan; and,

Fig. 6, an edge-view of chains constructed according to another part of my invention, differing in some respects from that already described.

Fig. 7, and fig. 8, shew separate views of the two descriptions of bars, links, or bolts employed. In this case there is one class of bolts, bars, or links, which have cylindrical projections, similar to those already described; the other bars, links, or bolts, having holes formed through them of the same form as the projections, in place of having recesses, consequently two bars with projections being laid together, having another bar, d , with holes through it (of the required size), the projections may be

said to act as an axis to the other or intermediate bolt, bar, or link, *d*, on which the same may turn freely. In this case I have only shewn two bars, *a*, *a*, to one bar, *d*, but it will be evident that by forming some of the bars, *a*, like the bars, *c*, of the former chain, that is, having four projections, *b*, on each, a wide chain may be made according to the purpose to which it is to be applied; and it will be evident that by combining the links, bars, or bolts, *a*, *a*, in pairs with one link, *d*, to each pair, a chain may be made only half the width of fig. 1; and further, by using more of the links, bars, or bolts, *c* and *d*, wider chains may be made than those shewn at fig. 1.

I would remark, that the chain shewn at fig. 1, is suitable for pit-chains, cables, and suspension-bridges, the only difference being, that in making chains for suspension-bridges, the links, bolts, or bars must be longer and stronger in proportion to their increased size; and the chain, fig. 5, is suitable for driving machinery, or other purposes, my invention only relating to the modes of forming the junctions of the links, bolts, or bars, for whatever purpose they may be applied. I have not thought it necessary to show many different lengths of links or bars, and they will necessarily be varied according to the purpose to which they are to be applied, as will also their figure or shape, whilst the modes of connexion will remain the same. It is important that the various parts of such chains should be made with care and with considerable accuracy, in order that one link, bar, or bolt, should not have to bear more strain than another, and that the sockets and projections should accurately fit, allowing however of the same turning with freedom. And in order to accomplish such accuracy of the parts, I have invented suitable dies for stamping the bars, links, or bolts, *a*, *c*, *d*. For making the bars, *a*, I have two dies fitting accurately together, and having projecting studs and holes to receive them, whereby the two dies are at all times ensured going accurately together. In one such die

is formed a recess of the figure of the bar, link, or bolt, *a*, and of such a depth as to receive about half the thickness of such a link, *a*. The other die is similarly sunk to the first, but in addition thereto there are two recesses therein, equal to forming or shaping the projections, *b*, with a nipple or stud in the centre, for the purpose of piercing the necessary hole for the pin to pass through; but if such hole should not be pierced entirely through by stamping, the piercing may be perfected by the means of a pair of piercing tools in a press; and in forming the bars, *c*, two dies, such as the one last described, are to be used, in order to form or shape the projections, *b*, on each side of the bars, links, or bolts, *c*, with nipples or studs therein to pierce the hole for the pins to pass through, as before described. In making the bars, bolts, or links, *d*, the dies are to be the reverse of those for producing the projections, *b*, such dies having projections formed therein to produce the sockets.

I would remark, that I am aware that the links, bolts, or bars of ordinary chains have been before made by stamping them in dies, I do not therefore claim the use of dies for such purposes generally; but my invention only relates to the improved mode of constructing dies suitable for shaping projections, *b*, and for producing cavities or sockets, *b*¹, as herein explained. In forming the bolts, bars, or links previously to stamping, I either forge the same into as nearly the figure desired as possible by hand, or cut them out of thick sheet-iron by means of a pair of tools worked in a press, or else I have bars rolled, leaving projections or recesses (as the case may be) at suitable intervals, and each link being heated to a bright red heat, it is inserted into its proper dies, and by pressure or by blows the same are caused to close and produce the figure of link, bolt, or bar desired; after which the projections, *b*, and the cavities are to be finished in the lathe by means of suitable tools.

Having thus described the nature of my invention, I

would have it understood that what I claim is, first, the mode of constructing and combining the parts of wrought-iron chains, which I have called the projections, *b*, the sockets, *b*¹, and the wrought-iron pin, *e*, as above described.

Secondly, I claim the mode of constructing wrought-iron chains with circular projections, *b*, and sockets, *b*¹, and pin, *e*, as described, in respect of figs. 5, 6, 7 and 8; and,

Thirdly, I claim the mode of making or forming links, bars, or bolts for chains with projections, *b*, and sockets, *b*¹, by the aid of dies, as above described.—In witness whereof, &c.

Enrolled September 12, 1839.

Specification of a Patent granted to MOSES POOLE, of Lincoln's Inn, in the County of Middlesex, Gentleman, for Improvements in Apparatus Applicable to Steam-Boilers, in order to Render them more Safe.—Sealed September 11, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—*Now know ye*, that in compliance with the said proviso, I, the said Moses Poole, do hereby declare the nature of the said invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The invention relates, first, to a mode of applying thin surfaces, to be burst by any material increase of pressure of steam in the boiler, and in such manner that other such surfaces may be readily replaced, without the boiler being put out of work by the bursting of a surface, thus offering a means of safety for the escape of steam, which can be at all times depended on.

Secondly, to a mode of applying a whistle to steam-boilers, in order to indicate when the water is below the proper working line. And in order to give the best information, in respect to the invention, in my power, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

The drawing represents a portion of a steam-boiler, with the improvements applied thereto. The apparatus being in section, in order to the same being readily understood, *a*, is an opening in the steam-boiler, at which the apparatus is applied. *b*, is a tube or way through which the steam can pass, as indicated by the drawing. *c*, is an enlarged end of the tube, *b*, and it is in this part of the apparatus where what I call the bursting or safety plate or surface is applied. *d*, is the bursting or safety plate, which is pressed on by the ring, *e*, such ring having a bell-mouth, in order to prevent the edges cutting the bursting or safety plate, when pressed on from below. *f*, is a ring with a flange, which screws into the upper part of the end of the tube or way, *b*, and by such means secures the safety or bursting plate in its place, the surface on which the plate, *d*, rests, being formed with an elevated ring or surface, over which the plate, *d*, is bent, in order that the holding around the edges may be the more secure. *g*, is a padlock by which the flanges of the ring, *f*, and the upper end of the tube, *b*, can be secured, and thus prevent any person removing the safety-plate or surface, *d*, unless with a key to open the lock. I would remark, that although the above mode of apparatus for affixing the plate, *d*, in its place, is very convenient and simple, I do not confine myself thereto, as the mode of affixing the plate in its place may be varied without departing from the invention. *h*, is a cock, the plug of which is also capable of being locked and secured, as is shewn in the drawing. The end of the tube, *b*, is filled with water, and both under and over the plate, *d*; the object of which

is to keep the plate, *d*, at an equal temperature. In working with this apparatus, in the event of the steam getting higher than the pressure it is determined (above the working pressure of steam), the plate, *d*, will burst, and permit the steam to flow off, and thereby reduces the excess of pressure in the boiler, and the plate may be then replaced, without stopping the working of the boiler, for the purpose of the engine; and the replacing of the burst-plate by another, is performed by shutting the cock, *h*, and removing the bursted plate by unscrewing the rings, which retain it in the end of the tube or way, *b*, and then placing a fresh plate, *d*. I have called the whole of the apparatus a tube, *b*, because, when combined together, the parts, in fact, make one continuous bent tube or way, and the nature of the parts being clearly shewn in the drawing, no further description thereof will be necessary, and the construction thereof may be varied. It should, however, be remarked, that it is important that the opening at *b*¹, *b*¹, should, on the one hand, be sufficiently large to relieve the boiler of the excess of pressure when the bursting takes place, and yet not be so large as to cause so powerful an explosion as to be injurious to the boiler; and it has been found desirable in carrying out this invention, to observe the French rule, directed by the Royal Ordnance, the twenty-ninth day of October, 1823, of making the size of the opening in proportion to the heating surface of the boiler, which is as follows, having measured every portion of the boiler, which in any way can be called heating surface, the proper size of opening is obtained in the following manner: engineers, in the habit of making calculations, will easily obtain the required diameter of an opening for a particular area of heated surface by the following formula.

$$D = 1, 3 - \sqrt{\frac{c}{n - 0,412}} \quad . \quad . \quad . \quad . \quad . \quad A$$

In this formula, *D*, represents the diameter desired to be obtained, expressed in centimetres. *c*, is the measured

surface of the boiler exposed to the action of the fire, whether directly or indirectly, by flues expressed in square metres; n , the quantity of the working pressure of the boiler and the result. A , will be the value of D , or the diameter of the opening, b^1 , b^1 . The material I employ for making the plate, d , is lead; but I do not confine myself thereto, as the invention does not consist in the using of weak places in boilers, nor does it consist in the material of which such weak places are made. But the invention consists of a mode of applying such thin bursting or safety-plates or surfaces, and in such manner that the boiler should not be put out of work by the bursting of a safety-plate or surface, the apparatus offering a ready means of applying a fresh safety-plate. The following is a table of thickness of lead applicable to the purposes set forth.

Diameter.	1½ Atmosphere.	2 Atmosphere.	2½ Atmosphere.	3 Atmosphere.	4 Atmosphere.	5 Atmosphere.	6 Atmosphere.	7 Atmosphere.
Inches.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.	Inch.
6½ 16	0½ 28	0½ 28	0¾ 28	0¾ 28	0¾ 28	0¾ 28	0¾ 28	0¾ 28

Note, it should be stated, that the above title is formed as if the bursting was into a vacuum; but as there is the atmosphere at all times external of a steam-boiler, the table in fact commences with a working pressure of half an atmosphere. It will be evident, that if the diameter of a given thickness of plate be increased, it will burst at a lower pressure of steam, and the diameter be increased, it will require a greater pressure to burst it; consequently, by a few trials the thickness and diameter may be obtained for any degree of pressure desired. It should be stated that the steam-way or tube, b , should at all times be as large as the opening, b^1 , b^1 , but preferably somewhat larger. In using the above described apparatus, it may be employed separately as a means of safety or conjointly with any of the ordinary safety valves; and in using it with other safety valves, the common safety valve should be so weighed as to allow of being lifted and admit

of the passage off of steam at a pressure a little less than would burst the plate, *d*.

I will now proceed to describe the second part of the invention. At an opening in the boiler is affixed a whistle, such as is shewn at *m*, having a plug, *n*, to fit the opening, the plug being in direct communication with, and attached to, a float ; such float, it is preferred, should be of light wood, encased in copper. *o, o*, is a framing which serves to keep the rod and plug, *n*, upright and correct to its work. *p, p*, are weights. It will be evident, that so long as the water is up to its proper working line, the plug will be closed ; but if the water sinks, the plug will descend, and the rush of steam through the whistle will indicate the want of water, and the noise will cease, so soon as the proper water line is again attained.

Having thus described the nature of the invention, and the manner in which the same is to be performed, I would have it understood, that what I claim is, first, the mode of applying bursting or safety plates or surfaces, as herein described ; and, secondly, I claim the mode of applying a float to work a whistle, as herein described.—In witness whereof, &c.

Enrolled March 11, 1839.

Specification of the Patent granted to JAMES GARDNER, of Banbury, in the County of Oxford, Ironmonger, for Improvements in Cutting Swedish Turnips, Mangel Wurzel, and other Roots used for Food for Sheep, Horn Cattle, and other Animals.—Sealed Dec. 12, 1838.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said James Gardner, do hereby declare the nature of my said invention, and the manner in which the same

is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

My invention relates to certain constructions and combinations of cutting edges or knives, with other apparatus, in order to produce machines for facilitating the cutting of turnips, mangel wurzel, and other roots, for food for animals; and, in order to give the best information in my power, I will proceed to describe the drawings hereunto annexed; but I would remark, that the object of the first combination of parts is to produce a machine which operates by revolving cranked or bent cutters, in some respects similar to the invention for which a patent was granted to me by his late Majesty King William the Fourth, bearing date September 28, 1834; and secondly, the other combinations of apparatus hereafter to be described, differ from those heretofore invented by me, inasmuch as the knives or cutting edges in the present machines, are fixtures; and having a ram or forcing instrument, by which the roots to be cut are forced against and cut by the knives or cutting edges employed.

Description of the Drawings.

Fig. 1, represents the section of a machine constructed according to the first part of my invention.

Fig. 2, is a plan thereof.

Fig. 3, shews a perspective view of the cutters and frame which carries them.

Fig. 4, shews the cutters or knives separately.

In each of these figures the same letters indicate similar parts. *a, a*, being the framing which carries the various parts, the nature of which is clearly shewn in the drawing. *b*, is the revolving cutter frame; this revolving frame consists of three surfaces of different diameters, *b¹, b², b³*, the object being to obtain a succession of steps or cranks or bends of the cutting edges or knives, which shall divide or

cut the roots into small portions. The frame, *b*, is affixed to and carried by an axis, *c*, turning in suitable bearings carried by the framing, *a*. On to this frame, *b*, are affixed the blades or knives, *h*, by screws or otherwise. *d, d*, is the wood cover which surrounds the cutting frame; and, *e*, is a hopper into which the roots are supplied, and the cutting is performed by causing the cutting-frame, *b*, to revolve by means of the crank handle, *f*; and *g, g*, are filling pieces placed across the chamber, in which the revolving cutting-frame works. The cutting-edges or knives, *h, h*, are bent at right angles to correspond with the succession of steps in the frame, *b*; by this means the portions cut will be square, but this may be varied by differently shaping the cutting-edges or knives, and it should be remarked that the cutting-edges of the knives are levelled inwards, to facilitate the cutting actions. The cutting frame carries two bent or cranked knives, *h*. The portions of the roots cut by the series of cranks or bends of each knife, pass through the frame, *b*, and fall down at the enlarged end of the frame, *b*, which is open, the smaller end of the frame, *b*, being solid and having a strong cross cast therewith; the frame, *b*, is thereby affixed to its axis, *c*; all which will readily be traced on examining the drawing, and it will only be desirable, in respect to this machine, to remark that although I have shewn it to consist of three steps or bends of the knife, it will be evident that this may be varied; and in place of having the frame in a series of steps to correspond with the steps of the knives, the cranked knives may be affixed to a frame of equal diameter at each end, having grooves on the periphery to correspond with the figure of the bends of the knives, and in such case the two knives should be so fixed on the frame as not to cut in the same line, but to take the angles or projections produced by the preceding cut, as is shewn at fig. 6, or similar cranked knives may be fixed to the face of a revolving surface or wheel, as is shewn at fig. 6½. The first described mode

of using cranked knives, being preferable for cutting larger pieces for larger animals, and the last being preferable for cutting small pieces for sheep.

I will now proceed to describe the second part of my invention.

Fig. 7, shews a side view ; and,

Fig. 7½, a back view, of a machine constructed according to this part of the invention. A, A, is the framing of the machine, the nature of which is clearly shewn in the drawing. In this arrangement the turnips or other roots to be cut are fed into a frame, composed of a system of cutting edges or knives, so arranged, that on the turnips or roots being pressed between the cutting-edges or knives, and a block or ram which is of a figure to fill or nearly to fill the frame of cutting edges or knives ; the turnips or other roots will be cut into small portions, depending on the arrangement of cutting-edges or knives, and these may be various, and I have shewn different arrangements, by which the nature and object of my invention will readily be understood. B, is a frame containing the cutting-edges or knives ; and C, is a block or ram of wood or other suitable material. The cutting frame, B, is carried by the lower framing, A, as is shewn in the drawing and the ram, C, is affixed to the guide-rod, D, which is guided in the framing of the machine, as is shewn at D¹, D². The ram or block, C, is moved up and down by means of the lever handle, E, and F, is a trough into which a supply of roots to be cut is placed.

Fig. 8, is a plan ; and

Fig. 9, is a section of the cutting-frame, B, there being two descriptions of knives employed, as is shewn at G and H. The knives, G, being set across the frame, one below the other in such manner as gradually to produce a triangular frame of knives or cutting edges, and the knives, H, consists of two angular cutting edges which are below the knives, G, and so placed, that on portions of the roots which have been cut by the cutting edges of the knives

c, coming against the edges of the knives, *h*, such pieces will be divided in their length.

Fig. 11, shews the plan of a cutting-frame, *b*, wherein there are two sets of knives, *h*, in order to shew that the roots may by this arrangement be cut into any sizes required, my invention not depending on the number of knives or cutting edges, *c*, *h*, which may be employed in a machine, but to the mode of arranging the same in combination with other parts. *i*, is a stop which prevents the ram or block being forced into the frame too far, and it will be evident that if roots be supplied by a workman by one hand into the frame, *b*, and the ram or block forced down by the other hand, turnips and other roots may be cut with quickness and facility.

Fig. 12, shews a plan; and

Fig. 13, a section of a cutting-frame, *b*, wherein only knives, *c*, are employed; and

Figs. 13½, and 14, shew two sections of another arrangement of knives in a cutting-frame, *b*.

Fig. 15, shews a plan thereof, and the other figures shew the separate parts. This frame, *b*, is made up of three forms of knives, *c*, *c*¹, and *c*², part of them being straight and part bent once, and part bent twice, all which will readily be understood on examining the figures of the drawing now under description; and I would remark that the shapes of the knives may be varied, provided the machine is arranged according to the mode herein described. And I would remark, that, although I prefer that the cutting or knife frame, *b*, should be a fixture, and the block or ram moveable as herein explained, yet it will be evident that the parts might be so arranged that the block or ram might be stationary, and the cutting frame made to move to the ram; but these are all variations of the same mode of constructing my invention. And I would have it understood that I make no claim to any of the parts separately, and variations may be made in some of the parts without departing from my invention. But

what I claim as the improvements secured by the present letters patent, is, first, the modes of applying cranked or bended knives in constructing a machine for cutting Swedish turnips, mangel wurzel, and other roots for the food of sheep and other animals, as is described in respect to figs. 1, 2, 3, 4, 5, 6, and $6\frac{1}{2}$; and

Secondly. I claim the mode of arranging the knives and constructing a machine for cutting Swedish turnips and other roots for the food of animals as described in respect to figs. 7, $7\frac{1}{2}$, 8, 9, 10, 11, 12, 13, $13\frac{1}{2}$, 14, and 15.—In witness whereof, &c.

Enrolled June 12, 1839.

Specification of the Patent granted to THOMAS TODD, of Kingston-upon-Hull, in the County of York, Gentleman, for Improvements in Propelling.—Sealed April 19, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Thomas Todd, do hereby declare the nature of my invention (which is improvements in paddles for propelling steam-vessels) and the manner in which the same is to be performed, is particularly described and ascertained in and by the annexed drawing and descriptions thereof as follows; viz.

Description of the Drawing.

Fig. 1, is a vertical section, on a small scale, across the paddle-wheel shaft of a steam-vessel, and shews the constant vertical position of my improved paddles during the revolution of the paddle-wheel. The paddles, No. 5, are just entering the water, No. 4, at their deepest immersion, and No. 3, just leaving the water. The paddles in

this figure are represented as plain three-fold paddles (see fig. 3.)

Fig. 2, is a perspective view of a three-rimmed paddle-wheel, and shews the constant vertical position of single paddles, as placed in both divisions of the wheel during its revolution.

Fig. 3, is another perspective view of a three-rimmed paddle-wheel similar to fig. 2, shewing the manner of placing any number of paddles on the arms or spokes and rims of the wheels at present in use, but the number of such places will, of course, depend on the number of arms or spokes in the wheel, and other circumstances. Only three sets of the three-fold paddles in one division of the wheel are shewn in this figure. N.B. The paddles in these three figures (1, 2, and 3) are to be considered as my improved paddles (see figs. 4 and 7) being represented only plain, to prevent confusion in the drawing. Only six places for paddles are represented for the same reason. The arrows shew the direction of the wheel.

Fig. 4, is a front view of one form or shape of my improved paddle. It is formed into zig zags or angles, as in the figure, on a large scale, or into a curved-shaped (see fig. 7.) A, A, is an axle passing through the centre of the paddle lengthwise, and securely fixed thereto. The gudgeons, Δ , Δ , at each end of the paddle, are turned and move in brasses, which are fixed securely to the arms or spokes and rims of the common paddle-wheels at present in use. By the arrangement very few alterations will be necessary in adopting my improvements. B, B, shews the top or upper side of the paddles; and C, C, the bottom or lower side of the same. The side, C, C, is weighted, so as to keep those paddles not immersed in the water, during the revolution of the wheel, in a vertical position.

Fig. 5, is a bird's-eye view, and shews the top or upper edge, B, B (see fig. 4). The side, E, E, is the head stroke, propelling the vessel forward, and the side, D, D, shews the back stroke propelling the vessel astern.

Fig. 6, is a front view of a plain paddle.

Fig. 7, is a bird's-eye view of another form or shape of my improved paddle on a large scale. The same letters refer to the same parts, as in fig. 5. It will be seen, on a careful examination of the drawings and descriptions hereunto annexed, that my improved paddles are self-adjusting, and do not require the mechanical aid of any stops, crank, levers, rods, grooves, eccentric wheels, pinions, chains, or any other kind of machinery, and that all extra friction is hereby avoided; also the tail, or back-water. This is not the case with the common paddles at present in use, the said back-water being universally acknowledged to be a very great drawback on the effective power of the engine. My improved paddles, by entering the water vertically, or very nearly so, will not occasion the tremulous motion, common to steam-vessels, at present so injurious to them, and so much complained of by passengers, and, by leaving the water in the same vertical position, the swell of the back-water is avoided, and, consequently the great danger to boats, &c., on approaching the steam vessel under way. My improved paddles begin their horizontal propelling action at the instant of their immersion, and continue the same until they leave the water; this is not the case with the common paddles. With my improved paddles, it matters not how deeply the vessel is loaded, but, with the common paddles, the deeper the vessel and the greater is the weight of back-water to be raised, occasioning danger to the machinery and loss of speed. My improved paddles can be readily fixed to the wheels at present in use.

Now I claim, as my invention, the peculiar forms or shapes of my improved paddles, as well also as the manner in which they act as self-adjusting without any mechanical aid of stops, cranks, levers, &c., &c., as before mentioned. This I also claim as my invention, and which, to the best of my knowledge and belief, is entirely new, and never before used or put in practice in this manner

in this kingdom. I make my improved paddles of iron or wood or any other proper material of any size, and in any number according to the size of the paddle-wheels, and other circumstances. I also claim an exclusive right to the manner of fixing two, or any greater number, of my improved paddles, on all or any of the spokes or arms of the paddle-wheels, as seen in fig. 3. And I further disclaim being the inventor of any of the things which it has been necessary for me to mention and describe, and which are not included in the above claims by me. I do hereby declare this to be my specification of this my invention, and I do verily believe that this my specification doth comply in all respects fully, and without reserve or disguise, with the proviso in the said herein before in part recited letters patent contained. Wherefore I do hereby claim to maintain an exclusive right and privilege to this my said invention.—In witness whereof, &c.

Enrolled March 20, 1840.

Specification of the Patent granted to SAMUEL HALL, of Busford, in the County of Nottingham, Civil Engineer, for Improvements in Propelling.—Scaled Oct. 7, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Samuel Hall, do hereby declare that the nature of my inventions, and the manner in which the same are to be performed are fully described and ascertained in and by the following description thereof, reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say):—

The objects of my improvements in propelling consist, first, in the withdrawing of the float-boards more or less

from the peripheries of paddle-wheels toward their centres and in the returning of them back again at pleasure, for the purpose of regulating the depth of their immersion in the water wherein the vessel to which they are applied is floating, according to circumstances, such as the depth of water the vessel is drawing, the roughness of the sea, the violence of the weather or any other occurrences which may take place to render such regulations of the situations of the float-boards desirable.

Secondly, not only in the regulating of the float-boards, as above described, but in the withdrawing of them entirely out of the water, or as nearly so as possible, when any circumstances render it desirable, such for instance, as when the wind is so favourable as to render it desirable to sail the vessel entirely thereby, and to cease altogether during that time from working the engines, and when that is no longer the case, in the returning of the boards to their proper situations in the water for the engines to be again put into operation.

Having stated the objects of my invention, I now proceed to describe the modes by which they are respectively obtained, reference being had, as before mentioned, to the drawings, and to the letters and figures marked thereon, the same letters shewing the same parts of the apparatus and machinery respectively in all the figures.

Description of the Drawing.

Figs. 1 and 2, are drawings of a paddle-wheel, with my improvements applied thereto; fig. 1, being a section of it taken through its centre in the direction from *a*, to *a*, in fig. 2; and fig. 2, is a view or elevation of it on the side next the vessel, except as to the slide-boxes, *F*, *F*, hereafter described, which are shewn in section. *A*, *A*, figs. 1 and 2, shew the paddle-wheel shaft. *B*, *B*, are the wheels (one of which is shewn separately at fig. 3) to receive the paddle-arms; such wheels being firmly fixed upon the shaft. *b*, *b*, are straight grooves in the arms of

the wheel, the grooves being as much deeper as the thickness of the paddle-arms at the ends of the grooves most remote from the centre of the wheel, to receive such arms, which are to be firmly fixed in the deepened ends by bolts, *r, r*; the grooves are consequently rendered of an uniform depth from end to end by being thus filled up at the deepened ends by such insertion of the paddle-arms. *c, c*, are other wheels, one of which is shewn separately at fig. 4, having grooves, *c, c*, in them of a spiral form. *D, D*, are the paddle-wheel arms, bolted, as before mentioned, into the outer and deepened ends of the grooves, *b, b*. *E, E*, are the float-boards, which are to move towards and from the centre of the wheel, as and when required, being fixed upon the arms with proper tightness by slide-boxes, *F, F*, one of which is shewn separately in section at figs. 5 and 6, the former figure being taken through the middle of the box lengthwise, and the other figure through it crosswise or transversely, they consist of a metallic plate, *d, d*, which forms the bottom of the box, and of another metallic plate, *e, e*, which is constructed so as to form the sides and top of the box. *f, f*, are two blocks of steel, or other suitable material, affixed within and at each end of each of the boxes, to fit as accurately as possible upon the paddle-arms, so as to allow the boxes to slide thereon, and between these blocks is inserted within each of the boxes a spring, *g*, of hammered brass, or other suitable material, to cause the boxes, and of course the float-boards which are attached thereto by bolts, *h, h*, figs. 5 and 6, to slide steadily along the arms, and bear with considerable firmness thereon. Plates of steel, *i, i*, or other suitable material, are inserted loose within the boxes between the arms and the springs, to prevent the wear of the latter, which would take place if when sliding they were to come in contact with the former. *Q, Q*, are flat sliding bars, shewn separately at figs. 7 and 8, the former figure shewing the flat side, and the latter the edges of them; they are for

the purpose of moving the float-boards toward or from the centre of the paddle-wheel; one end of each of these bars enters into the slide-box, *r*, in which they are secured by two strips of metal, *j*, *j*. There is another strip of metal, *k*, at the other end of each bar of a curved form, to enter and traverse in the spiral groove, *c*, *c*, hereafter mentioned; there are also two other strips of steel or other metal, *p*, *p*, on the other sides of the said bars, to keep them from bearing upon the paddle-arms, *d*, *d*. The spiral grooves of the two wheels, *c*, *c*, must exactly correspond with and face each other, so that when the metallic strips, *k*, of one set of sliding-bars, are brought as near to the centre of the paddle-wheel as the grooves will allow, the other set in the other wheel shall be in a corresponding situation; thus in that situation, as well as in all others, the two wheels containing the spiral grooves, which are connected together by the coupling-box, *h*, will cause the stripes, *k*, *k*, and of course (through the means of the sliding bars) each end of the float-boards respectively to assume a corresponding situation. It will be apparent that when the spiral-wheels, *c*, *c*, turn round along with the arms and other parts of the paddle-wheel, the boards will not have any traversing motion given to them toward or from the paddle-wheel shaft. But it will be evident that if on the one hand the two spiral-wheels be put in motion while the paddle-wheel is at rest, or, on the other hand, if the two spiral-wheels be retained at rest while the paddle-wheels are in operation, the float-boards may be moved inwards or outwards by means of the curved strips of iron, *k*, *k*, traversing in the spiral-grooves, *c*, *c*, and thereby moving the slide-bars, *g*, *g*, and the float-boards with which such bars are connected, as above mentioned, by the slide-boxes, *r*, *r*. In order therefore to effect the sliding of the float-boards, either while the engines, and of course the paddle-wheels, are in motion, or while they are at rest, I apply the toothed-wheel, *I*, *I*, which can move round freely on the paddle-

wheel shaft, and the toothed-rim, J, J, of the same size and pitch as the toothed-wheel, this toothed-rim is bolted to one of the spiral wheels, c, c, and this toothed-wheel and rim are then connected together by means of the two small toothed-wheels, κ^1 , κ^2 , which are keyed on the cross shaft, L. When the float-boards are required to be put in motion, while the paddle-wheel is standing still, a winch or handle is to be applied at either end of the cross-shaft, L, which are made square to receive it. By turning this shaft the wheel, κ^2 , will turn the spirals, c, c, round, in either direction, and thereby move the float-boards inwards or outwards, as may be required. But in order to move the float-boards inwards or outwards while the paddle-wheels are in operation, a stud-pin, l, is fixed on the loose toothed-wheel, I, I, and a lever, m, with a projection upon it, is applied for the purpose of being pressed upon the stud-pin, whereby the wheel, I, I, is stopped, and by its connexion with the wheels, κ^1 , and κ^2 , and the toothed rim, J, J, the spiral-wheels, c, c, are retained in a state of rest, so that the motion of the paddle-wheel shall cause the curved strips, k, k, to traverse in the spiral grooves, c, c, and thereby move the float-boards, as already described, inwards or outwards, according to the direction of the motion given to the paddle-wheels.

When it is desirable to draw or reef the float-boards out of the water, or close up to the wheels, b and c, for the purpose of propelling the vessel by wind instead of steam, or for any other reason, the paddle-wheel shaft may readily be disconnected from the middle shaft by the following means, which I have devised for that purpose.

Fig. 9, shews a paddle-wheel shaft, m, coupled with the middle shaft, n, by cranks, o and p, and a crank-pin, q; this pin is tapped or screwed at one end, whereby it is firmly screwed into the arm of the crank, p, and is kept from unscrewing by a set screw, q, or any other proper

means ; the other part of the pin which is not tapped or screwed passes with proper freedom into the other crank-arm, *o*, and the connecting rod of the engine, which is not here shewn, is fixed in the usual manner on the pin, *q*, between the two crank-arms. There is a round steel or other metallic plate, *n, n*, attached by screws with countersunk heads, *o, o*, to the inside of the boss of the crank-arm, *p*, in the centre of which plate there is a hole precisely the size of the untapped part of the pin which passes through it, and is held steady by it when the crank-arms are not connected together by it. When the shaft, *m*, is required to be disconnected from the shaft, *n*, the paddle-wheel must, by any suitable means, be held in a state of rest, which in consequence of the float-boards being taken out of the water, will be easily effected. The crank-pin, *q*, must then be drawn out by unscrewing it, until it has left the crank-arm, *o* ; but it must be left projecting so far out of crank-arm, *p*, as to support the connecting-rod, and render it unnecessary to disturb its brasses or straps, one end of the pin being held steady by the plate, *n, n*, and the other by the tapped part of the pin, which is not unscrewed from the crank-arm, *p*.

Having thus described the various parts of the apparatus which constitute my improvements in propelling, I now proceed to define and explain the extent of my claims, and that in numerical order, claiming every one of them, independent of each other, as respectively new and useful inventions. They consist, first, in any suitable inclined or incurvated eccentric surface or surfaces for sliding the float boards of paddle-wheels inward or outward, in whatever manner the inclined or incurvated eccentric surface or surfaces may be formed or applied, whether in the form of a single spiral groove, as shewn in this specification, or of two, three, or some other number of spiral grooves, or whether the spiral or spirals be in the form of a groove or grooves, as above mentioned, formed in a

wheel or boss, as herein described, or of a spiral or spirals projecting from, instead of sinking into, such wheel or boss, or in whatever other form it may be applied. It may be proper here to remark, that when the spiral or spirals are in the form or forms of a groove or grooves, only one of the curved metallic strips, *k*, is necessary to be applied to each of the slide bars to move or traverse in its respective groove, but that when the spirals project from the wheels, *c*, *c*, two such metallic strips are necessary, between which each of the projecting spirals is clasped, and travels to move the slide-bars inwards or outwards.

Secondly, I claim the combination of any inclined or incurvated eccentric surface or surfaces, as above described, with the arrangement of toothed-wheels, herein delineated, or any other suitable arrangement of machinery, for putting the inclined or incurvated eccentric surface or surfaces in motion, or for stopping them for the purpose of sliding the float-boards of paddle-wheels inwards or outwards, either while the engines and paddle-wheels are at rest, or while they are in motion, and without the necessity of stopping them, as in the former case, viz., while the sliding of the float-boards is effected, as would be necessary were the inclined or incurvated eccentric surface or surfaces only applied without the arrangement of toothed-wheels, herein delineated, or some other suitable machinery, for effecting the same purpose.

Thirdly, I claim the slide boxes and springs, hereinbefore described, or any other suitable elastic material, for the purpose of attaching the float-boards firmly to the paddle-wheel arms, and at the same time of allowing such float-boards to slide backwards and forwards on them with sufficient ease. Similar springs or elastic material, the use of which I also claim, may be applied at the sides, as well as on the edges, of the paddle-arms; and I make my claim to this mode of attaching the float-boards to paddle-wheels, whether in connexion with my invention, as before described, or not, and whether for moving or

reefing them by any other machinery, or by manual labour; and I claim this plan even as a mode of fastening the float-boards, and without moving or reefing them at all.

Fourthly, I claim the method herein described of connecting and disconnecting the paddle-wheel shaft, and the main shaft, whether in connexion with my reefing paddle-wheels, as herein described, or with any other kind of wheels or mode of propelling, to which such method of connecting and disconnecting the paddle-wheel shaft, and the engine shaft is applicable.

Fifthly, I claim the above means of moving or reefing float-boards for water-wheels, for propelling machinery and other purposes, as well as for paddle-wheels, for propelling boats, ships, or other vessels.

Sixthly, I claim the above mentioned means of sliding the float-boards, whether for the purpose of regulating the depth of their immersion in the water, or for the purpose of taking them out of the water altogether, or as nearly as possible, when required, whether for the purpose of allowing a steam-vessel to be propelled by the wind only, or for any other reason.

I would here observe, that I do not limit my claims to the precise means or apparatus or arrangement thereof, which I have described in this specification, for the attainment of all or any of the various objects above mentioned, as they are susceptible of many variations of form and mode of application, which are essentially and substantially the same as those which I have given as instances of my improvements, and the adoption of any of such variations would, as I consider, be as much infringements of my patent as the use of any of the precise means, apparatus, and arrangement, which I have herein delineated and described.—In witness whereof, &c.

Enrolled April 7, 1840.

Specification of a Patent granted to HARRISON GREY DYAR, of 286, Regent's Street, Oxford Street, in the County of Middlesex, Gentleman, and JOHN CHISHOLM, of Pomery Street, Old Kent Road, in the County of Surrey, Manufacturing Chemist, for Improvements in Obtaining Sulphur from Pyrites or Certain Native Sulphurets.—Sealed June 6, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, We, the said Harrison Grey Dyar, and John Chisholm, do hereby declare the nature of our invention and the manner in which the same is to be performed are fully described and ascertained in and by the following statement thereof, reference being had to the drawing annexed and to the figures and letters marked thereon (that is to say):—

Description of the Drawing.

Our improvement consists, first, in a mode of roasting pyrites or metallic sulphurets into the heated flue, *a*, where the sulphurous acid passes from the sulphuret contained in the furnace, *A*, fig. 1; we pass another flue, *b*, immediately from the furnace, *B*, where we have burning a column of coke; into this column of coke, which is fed by a moderate supply of atmospheric air, we pass in, at or near the centre of the column of burning coke, water, or the vapour of water or highly heated steam, so that the vapour of the water or steam will diffuse itself amongst the coke and passing through will be chiefly converted into hydrogen and carbonic oxide, when at the junction of these two flues, the sulphurous acid from the roasting sulphuret and the hydrogen-gas from the furnace into which water or steam was passed, will, at the elevated temperature so act as that the hydrogen will take the oxygen from the sulphurous-acid, and leave the sulphur free, which passing along a closed flue, *c*, will enter the chamber, *d*, and be condensed therein and may be re-

moved from time to time, there being a suitable opening in the chamber, *d*, for that purpose. When we act upon the bisulphuret of iron we prefer, before submitting it to this process to expel from the bisulphuret as much of the sulphur as can be drawn off by heat; our mode of expelling this sulphur is by heating the bisulphuret in the flue, *A*, of the furnace shewn at fig. 2, there being a chamber, *B*, in which we decompose the water, and we take the precaution of having the column of fuel in this furnace so long or high, that the air feeding this furnace will be deprived of its free oxygen or carbonic-acid before it arrives amongst the bisulphuret of iron, and as additional precaution, to prevent the burning of the sulphur, we pass into the furnace in the same manner as before described, some water or vapour of water so as to generate some free hydrogen to decompose the sulphurous-acid, or to unite with any free oxygen which may by chance have passed through the fuel, after having in this manner distilled off that portion of the sulphur which is capable of being expelled by heat in a furnace so arranged as to prevent the combustion of the distilled sulphur, we take the remaining sulphuret of iron and roast and treat it as at first described.

We claim as our improvement, the decomposing sulphurous-acid from roasted sulphurets by the agency of passing water or steam into a furnace so arranged as to give free hydrogen, and in expelling that portion of the sulphur that may be distilled by heat in a furnace so arranged as that the sulphur may be distilled from the pyrites or bisulphuret of iron without the combustion of the sulphur by the air feeding the furnace.

We claim also the mode of roasting and decomposing the sulphurous-acid from all sulphurets, as above described, as well as the mode above described of distilling off a portion of the sulphur from such sulphurets as will yield by this process of distillation, sufficient sulphur to render it expedient to distill off the sulphur in the manner above described, previous to the roasting process. We also

distill sulphur from the bisulphuret of iron by roasting them in retorts or ovens, excluding the atmosphere, these we form of fire-tiles or fire-bricks, having them formed with grooves at the mouth, so as to be closed by a fire-tile luted with clay and made perfectly air-tight; these retorts or ovens we prefer to be about two feet broad, four feet long, and six inches deep; at one end of each there is a pipe about four inches diameter, placed in a slanting direction into a small brick chamber; through this pipe the sulphur will flow in a liquid form and may be removed from the receiving chamber from time to time. The flues of the fire or furnace are so arranged, that, after traversing the external surface of the retorts or ovens, they pass over the exit pipe of the retort or close oven before entering the chimney; if the flue did not pass over these exit pipes, the vapour of sulphur would be condensed in passing through so cold a medium, and choke up the passage; or if the flue was to pass over it first it would be so hot that the sulphur would pass into the receiving chamber in a state of vapour. Retorts formed of earth, clay, or other material sufficiently refractory to withstand the necessary heat and embedded in clusters of 3, 5, or 7, in a reverberatory furnace, the retorts to be set in a manner similar to that observed in the distillation of coal for the manufacture of gas. We do not confine ourselves to any particular form for the retorts or ovens.—In witness whereof, &c.

Enrolled December 6, 1839.

Specification of a Patent granted to GEORGE NELSON, of Milverton, in the County of Warwick, Chemist, for a New or Improved Method, or New and Improved Methods of Preparing Gelatine which has the properties of or resembles Glue.—Sealed March 23, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso,
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I, the said George Nelson, do hereby describe and ascertain the nature of my said invention and in what manner the same is to be performed in manner following (that is to say) :—

I make such gelatine as above mentioned of two different qualities, and I call such gelatine according to its quality, my gelatine of the first quality, or my gelatine of the second quality ; and I use all such hides and skins, and cuttings of hides and skins as are usually employed in manufacturing glue according to the ordinary method, and which are commonly called glue-pieces, but I separate and reject any which have become putrescent as being unfit for the application of my invention.

My invention consists in using or applying to the glue-pieces which I use, a caustic-alkaline solution either with or without acid or acids (not being sulphurous-acid in a liquid state) without such solution for preparing gelatine, which has the properties of, or resembles glue. Before I apply my invention the glue-pieces which I use must be freed from hair or wool, and flesh and fat, and then washed clean in cold water, and when I make the gelatine, which I call my gelatine of the first quality, I prefer to use the cuttings of the hides of beasts or of the skins of calves.

I shall first describe the method by which I prepare the gelatine which I call my gelatine of the first quality, and for the purpose of reference I designate this method the first operation. I have already stated that when I make this gelatine I prefer to use the cuttings of the hides of beasts or of the skins of calves. When the cuttings have been freed from hair, flesh, and fat, and washed clean in cold water, I score the grain side of them to the depth of about an eighth part of an inch, in lines about an inch apart, in order to facilitate the action of the alkali which I use, and to render such action more uniform. I then macerate them in a caustic solution of alkali at a temperature of about 60 degrees of Fahrenheit, using for this

purpose brick vats or vessels lined with cement in the ordinary manner, and these vats or vessels, which I call the macerating vessels, must be covered with lids excluding the general atmosphere ; any vessels which are not acted upon by the alkali may be used. I thus macerate the cuttings until I can pass a fork or any other similar instrument through them with little resistance, and I generally find that they are sufficiently macerated in about ten days. The alkali which I prefer for my solution is soda, and I prepare my solution in the ordinary method, using three parts of the common soda of commerce, with two parts of fresh burnt lime to sixteen parts water ; or any quantity of fresh burnt lime, sufficient to render the solution caustic, may be used. When the process of maceration is sufficiently complete, as already pointed out, I remove the cuttings from the solution and put them into vessels similar to the macerating vessels, and which must also be covered with lids, excluding the general atmosphere, and I leave them in such vessels thus covered until they have become sufficiently soft. It will be ascertained whether they have become sufficiently soft by passing a fork or other similar instrument through them, and when they have become sufficiently soft, the flock or other instrument will pass easily through them. Whilst the cuttings are thus left to become soft they must be kept at a temperature between 60° and 70°, of Fahrenheit, and as they become sufficiently soft, as above pointed out, I remove them, and I slice or split such of the cuttings as are materially thicker than the others in order to bring them to the same or nearly the same thickness. I then put the cuttings into wooden cylinders placed in water vessels, filled with clean cold water, but care must be taken not to put into any cylinder more than half the quantity which it is capable of containing. These cylinders, which I call washing cylinders, must be constructed in such manner as to allow water to pass freely through them, and they may be fitted in the water-vessels

in any convenient manner to allow of their revolving within such vessels. I secure the cuttings within these cylinders, and then I cause the cylinders to revolve slowly in the water. I have found cylinders of three feet in diameter a convenient size, and I cause these to revolve at a speed of about one revolution in a minute. Whilst the washing-cylinders are thus revolving, I cause a current of water to be kept up through each of the water-vessels by means of an aperture at the bottom of the vessel at one end and a pipe at the top at the opposite end, through which pipe clean cold water is continually supplied. I continue the cylinders revolving in a current of water, as I have described, until the alkali is sufficiently washed out of the cuttings, and I generally find six or seven days sufficient for this washing, when I use cuttings of ordinary thickness, but when I use cuttings which are thicker than these I continue the washing in proportion to the thickness of such cuttings. When the cuttings have been thus washed I remove them from the washing-cylinders and place them in a wooden closet, constructed in the ordinary method to prevent the escape of gas, and there expose them to the direct action of sulphurous-acid gas produced by the combustion of sulphur within the closet. I continue the cuttings thus exposed to the direct action of this gas until they have a slight excess of acid, and I ascertain whether they have an excess of acid by testing them with litmus paper in the ordinary manner. I then remove them from the closet and press them by any ordinary means to separate as much water as possible; and after they have been thus pressed, I put them into glazed earthenware vessels or any other vessels which are not acted upon by acid. I call these vessels steam-baths, and I apply steam to them in the manner usually employed for heating steam-baths, but any other convenient means of heating them may be used; I thus bring the cuttings to a temperature of about 150° of Fahrenheit, and I keep them at this temperature,

and by means of a suitable wooden instrument I stir or agitate them until they are almost entirely dissolved. The liquid thus formed is gelatine, and I separate it from the residuum which remains undissolved, by straining, and put it into vessels which I call settling vessels, and which are constructed in the same manner as the steam baths. I heat these settling vessels in the manner which I have already pointed out for heating the steam-baths. Whilst this liquid gelatine is in these settling vessels, it should be kept at a temperature between 100° and 120° of Fahrenheit, and I allow it to remain undisturbed in the settling vessels, for the purpose of clearing it until I consider that the impurities which it contains have sufficiently settled or subsided; I generally find nine hours sufficient for this purpose, but if the impurities have not sufficiently settled or subsided in that time, I prefer to clear it by straining it through a woollen cloth. I remove the liquid gelatine from the settling vessels by means of a syphon, but any other suitable means may be used for this purpose, and after it has been sufficiently cleared I pour it upon slabs which I call cooling slabs, to the depth of about half an inch. These slabs may be of stone or slate or marble, but they must have frames of some convenient material, at least half an inch in depth, fitted to their edges, and care should be taken to place the slabs in cool situations. I allow this gelatine to remain upon the slabs until it becomes cold and sets into a firm substance, and I then cut it into pieces, and wash these in the washing-cylinders and water vessels which I have already described, in the same manner as I have already mentioned for that purpose in respect to the cutting, as I take them from the macerating vessels. This washing must be continued until the excess of acid is entirely or nearly altogether removed from the gelatine, and I generally find that three days are sufficient for this purpose; but I ascertain whether the excess of acid has been removed by testing the gelatine with litmus paper

in the ordinary manner. After the excess of acid has been thus removed, I take the gelatine from the cylinders and put it into the steam-baths, and then dissolve it by applying heat to the baths in the manner which I have already pointed out for that purpose, but it will be desirable to avoid raising the temperature of the gelatine above 85° of Fahrenheit. When the gelatine has been thus completely dissolved, I pour it again upon the cooling slabs, as before, and I allow it to remain until it becomes again cold, and sets into a firm substance. I then cut it into pieces of any convenient size, and dry it upon nets by exposure to a current of cool dry air, and when it has been thus completely dried it is fit for use.

In the operation which I have described, I have stated that a residuum of the cuttings remains undissolved. This undissolved residuum may be used in the manner which I have hereinafter mentioned for that purpose.

I call the gelatine which I obtain by the operation already described, my gelatine of the first quality; but equally good gelatine may be obtained from the cuttings of the hides of beasts, and of the skins of calves, by the use or application of alkali, without using or applying acid to such cuttings; and I shall now describe the method which I employ for this purpose, and for the purpose of reference, I designate this method the second operation. I treat the cuttings in the manner which I have described in the first operation until they have been washed and taken from the washing-cylinders, and I then press them by any ordinary means to separate as much water as possible, and after they have been thus pressed, I put them into the vessels which I call steam-baths, and heat these vessels by applying steam in the usual way for that purpose, until the cuttings attain a temperature of 120° of Fahrenheit; but any other convenient means of heating these vessels may be used. I keep the cuttings at this temperature, and stir or agitate them by any ordinary means for about four hours. The cuttings will thus be

partially dissolved, but in a smaller proportion than by the first operation. The liquid thus formed is gelatine, and I separate it from the residuum which remains undissolved by straining, and put it into the settling vessels. I heat these vessels in the manner which I have already pointed out for that purpose, and whilst this liquid remains in these vessels it should be kept at a temperature of 100° of Fahrenheit. I allow the gelatine to remain undisturbed in these vessels until the impurities which it contains have sufficiently settled or subsided. I generally find six hours sufficient, but it may be allowed to remain longer if considered desirable. After it has been thus cleared, I remove the liquid gelatine from the settling vessels, in the manner which I have already described for that purpose, and pour it upon the cooling slabs to the depth of about half an inch, and I allow it to remain upon these slabs until it becomes cold and sets into a firm substance; I then cut it into pieces of a convenient size, and dry it upon nets by exposure to a current of cool dry air, and when it has been thus completely dried it is fit for use.

I shall now describe the method by which I prepare the gelatine, which I call my gelatine of the second quality, and for the purpose of reference I designate this method the third operation. In making this gelatine I use any such glue-pieces as are hereinbefore mentioned, not being putrescent, and after they have been freed from hair or wool, flesh and fat, and are washed clean in cold water, I steep or soak them in a weak solution of acid other than sulphurous acid, and I prefer to use sulphuric-acid, muriatic-acid, or acetic-acid, but I find sulphuric-acid the most convenient, and I add acid to such solution from time to time, until the glue-pieces have an excess of acid. Any vessel may be used for this purpose, which will not be acted upon by acid. Or instead of thus steeping or soaking the glue pieces, I sometimes place them in a wooden closet constructed in the ordinary method, to pre-

vent the escape of gas, and there expose them to the direct action of sulphurous acid gas produced by the combustion of sulphur within the closet, and continue them thus exposed to the direct action of such gas until they have an excess of acid. I ascertain whether the glue pieces have an excess of acid by testing them with litmus paper in the ordinary manner; so soon as they have such excess I remove them from the solution, or from the closet (as the case may be), and put them into any convenient wooden vessels, and I keep them in these vessels at a temperature of about 70° of Fahrenheit about three weeks; I then put them into the steam-baths, and apply heat to these baths, in any convenient manner, until the glue pieces attain a temperature of about 180° of Fahrenheit, and I keep up this temperature until the glue-pieces are entirely dissolved.

The liquid then formed is gelatine; and I then proceed to treat this gelatine in the same manner as I have already mentioned in describing the method designated the first operation, after I have stated that the glue-pieces have been almost entirely dissolved, until this gelatine has been completely dried, and it is fit for use. In describing the method which I have designated the second operation, I have stated that a residuum of the cuttings remains undissolved. I use this residuum for the purpose of preparing the gelatine, which I call my gelatine of the second quality, in the manner herein-after mentioned. After this residuum has been separated from liquid gelatine, as hereinbefore mentioned, I put it into vessels constructed of wood or other suitable material, and whilst it remains in a heated state, I add to it, from time to time, diluted acid, not being sulphurous acid, until such residuum has an excess of acid; and I ascertain whether it has such excess by testing it with litmus paper, in the ordinary manner. I prefer to use sulphuric-acid, muriatic-acid, or acetic-acid, but I find sulphuric-acid the most convenient. This residuum, when it has an excess of acid, and the re-

siduum which I have stated remains undissolved, in describing the method designated the first operation, as this last mentioned residuum, is separated from liquid gelatine, may be treated either alone or together, with such glue-pieces, having an excess of acid, as I employ in preparing my gelatine of the second quality, in all respects in the same manner as I have already pointed out or referred to, as my mode of treating such glue-pieces, in describing the method which I have designated the third operation. If the residuum or the glue-pieces which I have in preparing the gelatine which I call my gelatine of the second quality, has been exposed to the action of sulphurous acid gas or of sulphuric acid, I prefer to remove from them any excess of acid, by adding a suitable quantity of lime, or carbonate of lime, to the liquid gelatine produced from them ; immediately after I remove such gelatine into the setting vessels, and in this case I allow such gelatine to remain undisturbed in the setting vessels, at a temperature not less than 100° of Fahrenheit, for a period of about twelve hours ; I then remove this gelatine from the setting vessels, in the manner which I have already described ; and I pour it upon the cooling slabs, as already pointed out, and allow it to remain upon these slabs until it becomes cold, and sets into a firm substance ; I then cut it into pieces of a convenient size, and dry it on nets, by exposure to a current of cool dry air, and when it has been thus completely dried it is fit for use. The gelatine, which I prepare by any of the methods hereinbefore mentioned, has the properties of, or resembles, glue, and may be applied to all the purposes for which gelatine is commonly used, under the name of size or glue, but my gelatine of the first quality may also be applied to culinary purposes.

Now, I hereby declare, that I do not claim as my invention the use of any particular vessels or apparatus, nor the preparation or application of any particular caustic alkaline solution, nor the use or application of sulphurous

acid, in a liquid state, nor the use or application of any acid in particular, except as hereinafter mentioned, in respect to the use of sulphurous acid, in a gaseous state, but I claim as my invention the use or application of a caustic alkaline solution, either with or without acid, and of acid other than sulphurous acid, without such solution to such glue pieces, as are hereinbefore mentioned, and as are not putrescent, for preparing gelatine, which has the properties of, or resembles, glue. And I also claim as my invention the use of sulphurous acid in a gaseous state, for exposing such glue-pieces, as are hereinbefore mentioned, and as are not putrescent, to the direct action of such acid in a gaseous state, in preparing gelatine, which has the properties of, or resembles, glue.—In witness whereof, &c.

Enrolled September 23, 1839.

Specification of the Patent granted to JAMES BOGARDUS, of Trinity Square, Tower Hill, in the City of London, Gentleman, for Improved Means of Applying Labels, Stamps, or Marks to Letters, and other such Documents.—Sealed August 26, 1839.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said James Bogardus, do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, are particularly described and ascertained, in and by the following statement thereof (that is to say) :—

The object of my invention is to annex a stamped or engraved label to a letter or other document, by means of the seal, thus avoiding the use of adhesive or gummed labels.

The label, whether of paper or parchment, may be of any size or shape ; and if it be required to affix one to a

letter by means of a wafer, let the wafer cover a portion of the label, and the rest of the wafer will seal the letter, the same may be done with wax.

But a better method is, to cut or pierce a hole in the label, which hole, being placed where the wafer or wax is placed to seal the letter, the act of sealing the letter affixes the label, and this method may be applied to any document whatever.—In witness whereof, &c.

Enrolled February 26, 1840.

LAW REPORTS OF PATENT CASES.

*Court of Common Pleas, Westminster,
November 29, 1839.*

Before Lord Chief Justice TINDAL, and a Special Jury.

GALLOWAY v. BLEADEN.

(Continued from page 228.)

Mr. Hill.—May it please your lordship, gentlemen of the jury, it now becomes my turn to address to you some observations upon the case which has been presented to you by my learned friend, the Attorney-General, and also to state what, on my part, I shall find it necessary to lay before you, on the part of the defendant. My learned friend began by stating, that his client was a gentleman to whom steam-navigation was much indebted; he described to you the invention which is the subject of the present cause; he spoke of its brilliant success; he said, that no sooner had this invention been made known than it was adopted by steam-boat companies, by private individuals, and I thought he had said also by the Government; therefore I thought we should have had an array of witnesses, because, if he be correct, none could be wanting to shew to you the wonderful success which had accrued to the proprietors of the steam-paddles made by the plaintiff. We have heard something of the Great

Western,—is any one person brought forward connected with that vessel. What you heard from Mr. Carpmael, yesterday, was mere hearsay. Gentlemen, I shall shew you, on the part of my client, who has, I think, been attacked very unnecessarily by my learned friend, that all his brilliant anticipations have been failures. Gentlemen, my client purchased two pair of paddles from the plaintiff; but as a proof that they did not succeed, I shall shew you that they have been all taken away and replaced by other paddles of the most simple construction; and although my friend's clients have had models made for the purpose of shewing, they have never ventured to explain them. However, we may also have a little better fortune with the Chieftain; and I think we shall not require much mathematics to get a proper idea of its construction. (The learned counsel then explained the nature of the wheels represented on the models of the Grand Turk and Chieftain, which were fully described by the witnesses for the plaintiff.) Gentlemen, my clients having adopted the paddle-wheel which I have described in preference to those of the plaintiff's, were much surprised to find, that my learned friend had been instructed to make charges against them, when they thought that they were the injured parties. But it seems that my clients are the persons against whom the wrath of the Attorney-General is directed; but it is Mr. Field who is trying to put an end to this brilliant success, and of course Mr. Field is the object of attack. But, gentlemen, if Mr. Field is the object of attack, I do not very well understand why the action was not brought against that gentleman. My learned friend says, "we could have attacked Mr. Field for fitting up the Great Western, which is upon our principle." Now, if so, is it not very extraordinary that no one person is brought here, to shew to you a model of the Great Western's paddles. But there is another thing that astonishes me, and that is this, that notwithstanding the amazing success of Mr.

Galloway's wheel, my learned friend, to exemplify this success brings before you the wheels of the Great Western. One would have thought that my learned friend would have chosen some vessel actually fitted by Mr. Galloway, or under Mr. Galloway's auspices. But no; he applies to some vessel which was not made by Mr. Galloway, and which I will shew you was not on Mr. Galloway's principle. Gentlemen, I shall call Mr. Field, and you will hear from him the account of the whole transaction as far as he is concerned. Gentlemen, you have heard that, formerly there were no split-paddles in use—that you heard from Mr. Carpmael—but what had a motion distinct from the motion of the wheel itself. Now those were the only sort of split-paddles that had been heard of, up to the time I am about to mention, and those paddles Mr. Carpmael said were arranged on the radial principles,—they only differed from the common steam-boat paddles inasmuch as, instead of the one float, the one float was cut up into several sections, and these sections had each an independent motion, but they were on no line, either curved or straight, out of the radius of the wheel, and they were none of them fixed, but had a motion. Gentlemen, you were told by the first witness that all machinery connected with steam-paddles must be of the simplest description, it is so very liable to get out of order. That was the fault of Morgan's patent, which you will remember was upon the principle of feathering the oar. It was very important to approximate, as nearly as well could be, to this principle, where the parts should be fixed, as you have seen by models which have been shewn to you. Now it occurred to Mr. Field, that it would be desirable to bend a board into a form that would be a cycloidal curve; but although this form entered the water very well, it was found that, on coming out, it spooned out the water with it, and the evil of the resistance more than balanced the advantage of the ease with which it slipped into the water. Mr. Field then divided the float into

sections, and placed three sections at such a distance from each other that the water would run through. Mr. Field tried his experiments in May, 1833, and submitted his plans to the Lords of the Admiralty. But my learned friend says, "Oh you ought to have taken out a patent!" Gentlemen, I think such a firm as Maudsley, Son, and Field, are better employed than taking out patents. Gentlemen, in 1833, Mr. Field fitted up the Endeavour with one of his wheels and one of the old ones, and run publicly for six weeks from London to Richmond, there was no concealment or anything like it. I shall call before you Mr. Berry, who went on board and examined the parts, and made himself acquainted with the application of this principle, long before Mr. Galloway took out his patent. Mr. Field continued his experiments, and registered a table of his improvements; and to shew that the cycloid was not new, but was perfectly known by him, I have among the paddles whose results are registered, one which is entitled "wheel of nine cycloidal paddles." So much for priority. I shall show you that so far from confining this even to his own workmen, that Mr. Field actually invited gentlemen from Woolwich to inspect the invention, in fact he did every thing but keep this matter a secret. Why, gentlemen, even the number of persons to whom this was shewn, was a matter of great importance, but, when you look at their quality, it becomes much more important than their number. It would be much less a publication, to take a steam-packet paddle to a large inland town, and shew it there in the market place to thousands, than it would be to shew it to a dozen of the principle engineers in the metropolis, who are interested about such matters. Therefore, gentlemen, I shall submit to his lordship, that even if the patent were good in other respects, and even if an infringement had been proved, there was a publication of this invention previous to the time when Mr. Galloway's patent was granted. Now, gentlemen, let me ask whether the patent has been infringed.

Mr. Galloway, in his specification, says, "I do not claim the splitting of paddles into parts, nor do I claim the paddles when they are put on as they are put on in a certain drawing which he gives," which he says, "was the drawing of the Endeavour." Now, gentlemen, it is quite clear therefore, that the patentee knows very well that he cannot support his patent, for two of the inventions which I have mentioned, namely, splitting the fixed paddle, and putting the paddles upon the wheel, in some manner different from putting them on the radial arm of the wheel, that is quite clear. Now see the ingenuity of Mr. Galloway, who with the assistance of Mr. Carpmael, an ingenious inventor, who is not an inventor of paddle wheels, but an ingenious inventor of specifications, there lies Mr. Carpmael's talent: it is his profession, and a very eminent person he is in his profession, but that is the nature of the invention, and not of paddle wheels that go faster, but of specifications that will hold water. We will see whether Mr. Carpmael has succeeded; I am afraid in this instance, notwithstanding all his exertions, he has been attempting to make bricks without straw, and he has failed. Mr. Galloway finds that it is too absurd to claim the fixed paddles; that cannot be done. It is absurd to say that he invented the plan of departing from the radial arm, and putting the floats on some other place. But he says, "Let us get a little mathematics together; let us get a little stock of hard words, and then we will see if we cannot map out a territory and claim that territory, and that shall be the only territory in which any man of sense will vary from the radial line, and then we shall get, by hook or by crook, the cycloidal curve, that which we cannot get in a straight line." Although Mr. Galloway has actually disclaimed the Endeavour's paddles, I will show you that he does claim it. Mr. Cottam says, he claims all the territory in which it can be. If it is not in that it is nowhere; and Mr. Cottam says, "We do not confine ourselves to cycloidal curves, we may use involutes, or evo-

Intes, or volutes ; we may do any thing at all till we go out of the family of curves, and come into the family of straight lines." That is, you cannot have any line curvilinear or rectilinear where the magical territory cannot operate. (The learned gentleman proceeded to read the specification of Galloway's patent, commenting on many of the parts as being ambiguous, and that the invention was so described as would be utterly impossible for the most competent workman to make the paddles from the specification alone. The objections raised were however overruled by the learned judge.) Now, gentlemen, the plaintiff's witnesses have spoken of the drawing of Mr. Field's wheel, I apprehend that that drawing will be found incorrect ; but whether the variations from correctness are important, will be seen by the evidence of the witnesses. Gentlemen, I have but one word more ; you see, gentlemen, having traced the invention up to the time when the two vessels, one called the Chieftain, and the other called the Grand Turk, are made, you see clearly that the reason why the floats take the form they do in those vessels is not from any abstract love of cycloids, or any thing of that sort. They are placed back and front there for safety and security ; for it is found that although it holds true as an abstract truth in mathematics, that you may generate a cycloidal curve so that the floats enter the water in the same gash, as the workmen say, and thereby weaken the resistance, yet that is only one truth among a great many other ; and a little sacrifice of that, or a considerable sacrifice of that, if it is necessary for the purpose of fastening the paddles close down, and you will find so far from its being advisable to cut up the float into six parts, as it is here, that three is the maximum, and that is believed only two would be even better than three ; therefore you see, gentlemen, that this float is placed there for the purpose of being fixed in a simple and strong manner, which all the witnesses say is the only one which is practicably useful, and not from any

wish or any knowledge even of this gentleman's invention; not but, if I am correct in what I have already stated, they had a right to do what they pleased with his supposed invention; but I am now saying, suppose his patent to be good, that which we have done is no infringement of the invention claimed in the specification of his patent. Gentlemen, you will have men of science and men of practice brought before you, who will point out many matters into which necessarily I have not ventured to go, because they explain scientific subjects somewhat more clearly than I can pretend to do. Thus, gentlemen, on the whole, I say there is no pretence for saying that the plaintiff is the first and true inventor: there is no pretence for saying he has made a just, and proper, and full discovery of the best mode of carrying his discovery or invention into execution. And, thirdly, I say, supposing those two grounds mere fallacies, which I respectfully contend they are not, that, finally, there has been no infringement of this patent.

Joshua Field sworn.—I am an engineer. In 1833 I made an improved wheel, a model of which I took to the Admiralty; it was carefully examined by the lords of the Admiralty, and fully explained by me and my partner; their lordships determined on adopting the wheel, and gave orders that the first vessel that required fitting up should have my paddle. It was not applied to the first vessel, in consequence of the machinery having been made by some other firm. I left the model at the Admiralty about a week. When I got it home I exhibited it as a novelty to any persons who wished to see it. I had one of the wheels fitted to the *Endeavour*: it had the effect I anticipated,—the agitation of the water was quite removed. I continued the experiments some weeks, during which time the vessel was running between London and Richmond, carrying passengers. In 1835 I made a great many experiments, in order to ascertain the properties of various kinds of wheels, chiefly to compare

the cycloidal wheel, which I discovered in 1833, with Morgan's and the common wheel. I have carefully examined the plaintiff's wheel, and the specification of his patent; the invention is precisely on the same principle as the wheel I invented in 1833. I had the same object in view, that of arranging the paddles on a cycloidal curve upon a curve generated by the rolling of the wheel upon a rolling axis—a rolling circle. The wheels on the Chieftain and Grand Turk are on the principle of my wheel of 1833.

Cross-examined by *Mr. Attorney-General*.—I have taken out several patents: I did not take out a patent for my wheel, but the idea of doing so crossed my mind. I think a valid patent for this wheel would be very valuable. The first vessel I fitted up with these paddles was in the spring of 1836; it was the Dovor Castle. Her speed was not increased by adopting my wheels. I have fitted up five or six vessels with these wheels. The Great Western is one of them. I did nothing for the Admiralty before August, 1835. I fitted up many vessels in 1833 and 1834, but I did not use my divided paddle. I took the paddle off the Endeavour after the experiment, and put on the old radial wheel. I did not fit up any other vessel with my improved wheel, either in 1833, 1834, or 1835; the first I fitted up was the Dovor Castle in 1836. I commenced my experiments again in 1835, and continued them till about August of that year. I have the specification; the Grand Turk is made according to the specification. The Chieftain paddle has not so many bars, neither are they fixed in the same manner, but it is on the same principle of divided boards, placed on something like a cycloid. I do not consider it is of so much importance that the float-boards should be placed so near to each other as described by the witnesses. My object was to have the same quantity of float as the common paddle, and that the parts should follow one another in succession; it was no part of my object they

should be so near together: I consider it immaterial, so far as the propelling goes, what distance the floats are apart. I consider that each float acts independently, I do not see how they can assist each other. It is desirable to have the greatest resistance, but the resistance will not be increased, till the parts are actually in contact. My object was to get the paddles in the water to follow each other on the cycloidal curve, and to do that, they must be near each other; but I did not mean to place them so near, with a view to increase the resistance.

James Jarvis sworn.—Examined by *Mr. Alexander*.—I was Captain of the *Endeavour* in 1839; the model of the wheel used on that vessel is quite correct. We tried it a month or six weeks. I thought it went a little faster than by the old paddle, and made less sea. A great many persons looked at the wheel during that time.

James Sheriff sworn.—Examined by *Mr. Hill*.—I am one of Messrs. Maudsley and Co.'s foremen; I superintended the fitting up of the *Endeavour* with a paddle of the same construction as the model which has been shewn me. She continued her journey to and from Richmond with this paddle, about a month, or six weeks.

Peter Barlow sworn.—Examined by *Mr. Hill*.—I am Resident Engineer on the South Eastern Railway; I was engaged by Mr. Field to arrange the results of his experiments, in order to compare them with other paddles. Strangers were admitted to see these experiments. I saw the model of the paddle which Mr. Field exhibited to the Lords of the Admiralty, it was made on the cycloidal principle, that is, precisely on the principle which the patent claims.

Cross-examined by *Mr. Attorney General*.—I have not been engaged in making paddles, but I had great opportunities while living with my father at Woolwich, of seeing a great many wheels. In my opinion if the float-boards of the divided wheel are very close, they will act as one paddle, and will not allow the water to escape. The pro-

pulling power of a paddle is the least when it is vertical, and it is greater when it first enters the water. It may be considered a peculiar opinion, but if my work is consulted it will be found that I am correct. I think no advantage could result from keeping the sections of the float-board near together. If they are very near together they will hold the water more, but if at a few inches apart, or any distance to allow the water to escape, it is of no consequence whether they are made at any great distance.

John Kingston sworn.—Examined by *Mr. Alexander*.—I am superintendant of steam-vessels at Her Majesty's dock-yard at Woolwich. I remember the cycloidal wheel that Mr. Field had in 1835; it does not differ much from the wheels of the Grand Turk and the Chieftain; the only difference is that they have not got the cycloidal curve so much. There have been several wheels supplied from the dock-yard on the same principle, with only the float-boards.

Cross-examined by *Mr. Attorney-General*.—There is less trouble in getting up the paddle with two floats than with six. The first government vessel that was with the split-wheel was the African.

James Simpson sworn.—Examined by *Mr. Alexander*.—I am engineer to the Chelsea Water Works. I was present at some experiments with the cycloidal wheels at Messrs. Maudsley's in 1835: the principle of cycloidal wheels used in the Endeavour, and those of the Grand Turk and Chieftain, I consider identical.

George Blackland sworn.—Examined by *Mr. Alexander*.—I am engineer to the Commercial Steam-Packet Company. I entered their service in 1837: they had at that time the Kent and City of Glasgow fitted with Galloway's paddles. We had frequent complaints of the rivets getting loose. I found the wheels in such a dilapidated state, and so much trouble and expense in keeping them in repair, that we took them off and put on wider floats, divided into three parts. These repairs were made by

Messrs. Maudsleys. I had three boards, and raised the first paddles by means of a block, four inches wide, fixed on the radial arm.

The Lord Chief Justice.—What is this evidence directed to.

Mr. Hill.—It shews, my lord, how he altered the vessels that were fitted up by the plaintiff.

The Lord Chief Justice.—What is the object. There is no plea on record that it is not useful: I suppose it is directed to its not being useful. There is no such plea.

Miles Berry, sworn, examined by *Mr. Hill.*—I am a patent agent and civil engineer. I saw Mr. Field's cycloidal wheel, when it was fitted to the *Endeavour*, I think in 1833. The floats were divided into two or three portions; they were placed and arranged as steps, which, to me, was then a novelty in the application of floats to paddle-wheels: one was on a radial arm, another in the advance of it, and the third, I think, on the outer arm of the wheel; but how they were exactly fixed in that position, I do not recollect, although, I believe, the model is a very correct representation. I consider that the portion of the floats on the *Endeavour* are arranged on what Mr. Galloway in his specification calls a cycloidal curve; that is, a kind of curve generated by the rolling circle. I do not call the position of the Chieftain or the Grand Turk placed as a cycloid: they may pass through any given point, which you may say is on a given point on a rolling surface. They are placed in a straight line; and in order to get the one a little advanced, the man puts a block of wood to push it a little further.

Cross-examined by *Mr. Attorney General.*—When I was on board the *Endeavour*, I examined the paddles, but not to ascertain at what curve it was at which the floats were fixed. I think material, that the floats should not be too wide apart, or divided into too many parts. It is material the floats should be so near to each other, as to prevent the water escaping between the interstices, and

that they should act as nearly as possible as one float-board; and when they are leaving the water, they should allow the water to escape as from a seive.

(To be concluded in our next.)

PATENTS GRANTED FOR SCOTLAND,

From December 23, 1839, to April 22, 1840.

JAMES JAY, of Belton, in the county of Haddington, Scotland, Captain in the Royal Navy, for an improved plough, to be called The Belton Plough.—Sealed December 23, 1839.

CHRISTOPHER NICKELS, of the York Road, Lambeth, in the county of Surrey, Gentleman, for improvements in propelling carriages. Communicated by a foreigner residing abroad.—Sealed December 24, 1839.

JOSEPH GIBBS, of Kennington, in the county of Surrey, Engineer, for an improvement or improvements in the machinery for preparing fibrous substances for spinning, and in the mode of spinning certain fibrous substances.—Sealed December 24, 1839.

THOMAS EDMONDSON, of Manchester, in the county of Lancaster, clerk, for certain improvements in printing presses.—Sealed December 31, 1839.

JAMES NASMYTH, of Paticroft, near Manchester, in the county of Lancaster, Engineer, for certain improvements applicable to railway carriages.—Sealed December 31, 1839.

THOMAS LAURENTE LAMY GODARD, of Christopher's Street, Finsbury Square, in the city of London, Merchant, for improvements in looms for weaving to be worked by steam or other power. Communicated by a foreigner residing abroad.—Sealed January 8, 1840.

JAMES BRADFORD FURNIVAL, of Street Ashton, in the county of Warwick, Farmer, for improvements in apparatus or materials to prevent persons and quadrupeds

sinking when in the water. Communicated by a foreigner residing abroad.—Sealed January 8, 1840.

WILTON GEORGE TURNER, late of Park Villa, Regent's Park, in the county of Middlesex, but now of the town and county of the town of Newcastle-upon-Tyne, Doctor of Philosophy, and **HERRBERT MINTON**, of Longfield Cottage, in the parish of Stoke-upon-Trent, in the county of Stafford, Manufacturer, for an improved porcelain.—Sealed January 9, 1840.

RICHARD BEARD, of Egremont Place, New Road, in the county of Middlesex, Gentleman, for improvements in printing calicoes and other fabrics. Communicated by a foreigner residing abroad.—Sealed January 9, 1840.

ALEXANDER FRANCIS CAMPBELL, of Great Plumpstead, in the county of Norfolk, Esquire, and **CHARLES WHITE**, of the city of Norwich, Mechanic, for improvements in ploughs, part of which improvements are applicable to harrows and other agricultural implements.—Sealed January 9, 1840.

ROBERT MONTGOMERY, of Johnstone, in the county of Renfrew, in the kingdom of Scotland, Gentleman, for an improvement or improvements in spinning machinery applicable to mules, jennies, slubbers, and other similar mechanism.—Sealed January 9, 1840.

WILLIAM VICKERS, of Firs Hill, in the county of York, Steel Manufacturer, for an improvement in the manufacture of cast steel. Communicated by a foreigner residing abroad.—Sealed January 10, 1840.

CHRISTOPHER EDWARD DAMPIER, of Ware, in the county of Hertford, Attorney-at-law, for an improved weighing machine.—Sealed January 14, 1840.

JOHN LESLIE, of Conduit Street, Hanover Square, in the county of Middlesex, Tailor, for improvements in measuring the human figure. Communicated by a foreigner residing abroad.—Sealed January 15, 1840.

WILLIAM HARPER, of Couper's Court, Cornhill, in the

city of London, Patent Stove Manufacturer, and THOMAS WALKER, of Birmingham, in the county of Warwick, for improvements in stoves and grates, and in preparing metal plates for such stoves and for other purposes.—Sealed January 15, 1840.

MATTHEW HEATH, of Furnival's Inn, in the city of London, Gentleman, for improvements in clarifying and filtering water, beer, wine, and other liquids. Communicated by a foreigner residing abroad.—Sealed January 15, 1840.

THOMAS CLARK and CHARLES CLARK, of Wolverhampton, in the county of Stafford, Ironfounders and Copartners, for improvements in glazing and enamelling cast-iron hollow ware.—Sealed January 15, 1840.

JOHN AINSLIE, Farmer, Redheugh, near Dalkeith, for a machine for a new and improved mode of making tiles, bricks, retorts, and such like work, from clay.—Sealed January 20, 1840.

SAMUEL WHITE WHITE, of Charlton Marshall, in the county of Dorset, Esquire, for improvements in preventing persons from being drowned.—Sealed January 20, 1840.

ARTHUR ELDRED WALKER, of Melton Street, Euston Square, Engraver, for improvements in engraving by machinery.—Sealed January 20, 1840.

ROBERT LORIMER, Brass Founder, 45, Jamaica Street, Glasgow, in the county of Lanark, North Britain, for an improvement or improvements in stoves.—Sealed January 25, 1840.

MILES BERRY, of the office of Patents, 66, Chancery Lane, in the county of Middlesex, Patent Agent, for an invention or discovery by which certain textile or fibrous plants are rendered applicable to making paper, and spinning into yarns, and weaving into cloth, in place of flax, hemp, cotton, and other fibrous materials, commonly used for such purposes. Communicated by a foreigner residing abroad.—Sealed January 27, 1840.

JOHN JONES, of Westfield Place, Sheffield, in the county

of York, for a new frying and grilling pan, for the cooking of steaks, chops, and other meats.—Sealed January 29, 1840.

ROBERT HERVEY, of Manchester, in the county of Lancaster, Dry Salter, for certain improvements in the mode of preparing and purifying alum, alumina, aluminous mordants, and other aluminous combinations and solutions, and the application of such improvements to the purposes of manufacture.—Sealed January 31, 1840.

FRANCIS WORRELL STEVENS, of Chigwell, in the county of Essex, School Master, for certain improvements in apparatus for propelling boats and other vessels on water.—Sealed February 1, 1840.

WILLIAM ISAAC COOKSON, of Newcastle-upon-Tyne, Esquire, for certain improved processes or operations for obtaining copper and other metals from metallic ores.—Sealed February 3, 1840.

GEORGE WILSON, of St. Martin's Court, St. Martin's Lane, in the county of Middlesex, Stationer, for an improved paper-cutting machine.—Sealed February 3, 1840.

MILES BERRY, of the office for Patents, 66, Chancery Lane, in the county of Middlesex, Patent Agent, for certain improvements in machinery or apparatus for making or manufacturing pins, and sticking them in paper. Communicated by a foreigner residing abroad.—Sealed February 5, 1840.

GODFREY ANTHONY ERMEN, of Manchester, in the county of Lancaster, Cotton Spinner, for certain improvements in machinery or apparatus for spinning or doubling or twisting cotton, flax, wool, or other fibrous materials, part of which improvements are applicable to machinery in general.—Sealed February 5, 1840.

JAMES CAPPLE MILLER, of Manchester, in the county of Lancaster, Gentleman, for certain improvements in printing calicoes, muslins, and other fabrics.—Sealed February 7, 1840.

JOHN ALEXANDER PHILIP DE VAL MARINO, of No. 17, No. LXXVII.—Vol. XIII.

Clifford Street, Bond Street, in the county of Middlesex, Esquire, for certain improvements in the manufacture of gas, and in the apparatus employed for consuming gas for the purpose of producing light.—Sealed February 7, 1840.

JOHN FRANCOIS VICTOR FABIEN, of King Street, in the city of London, Gentleman, for improvements in pumps. Communicated by a foreigner residing abroad.—Sealed February 12, 1840.

JONATHAN FELL, of Workington, in the county of Cumberland, Ship Builder, for improvements in building ships and other vessels.—Sealed February 12, 1840.

JOHN REYNOLDS, of Victoria Hotel, Euston Square, in the county of Middlesex, Esquire, for improvements in the manufacture of salt.—Sealed February 12, 1840.

HENRY PINKUS, late of Pensylvania, in the united States of America, but now of 77, Oxford Street, in the county of Middlesex, Gentleman, for improvements in inland transit, some of which improvements are applicable to, and may be combined with, an improved method of, or apparatus for, communicating and transmitting or extending motive power, by means whercof carriages or waggons may be propelled on railways or roads, and vessels may be propelled on canals.—Sealed February 19, 1840.

JAMES BEAUMONT NEILSON, of Glasgow, Gentleman, for certain improved methods of coating iron under various circumstances, to prevent oxidation or corrosion, and for other purposes.—Sealed February 25, 1840.

WILLIAM PONTIFEX, of Shoe Lane, in the city of London, for an improvement in treating fluids containing colouring matter, to obtain the colouring matter therefrom.—Sealed March 3, 1840.

THOMAS ORAM, of 27, East Street, Red Lion Square, in the county of Middlesex, Gentleman, for improvements in the manufacture of fuel.—Sealed March 5, 1840.

WILLIAM FORRESTER, residing in Barrhead, in the county of Renfrew, manager at Levern Mill, for certain improvements in sizing, starching, and otherwise prepar-

ing warps for weaving fabrics, and in the machinery or apparatus therewith connected.—Sealed March 6, 1840.

JOHN BURN SMITH, of Salford, in the parish of Manchester, in the county of Lancaster, Cotton Spinner, for certain improvements in machinery for preparing, roving, spinning, and twisting cotton and other fibrous substances.—Sealed March 6, 1840.

LAURENCE WOOD FLETCHER, of Chorlton-upon-Medlock, Manchester, in the county of Lancaster, Machinist, for an improvement or improvements in the manufacture of woollen and other cloths or fabrics, and in the application of such cloths or fabrics to various useful purposes.—Sealed March 14, 1840.

JSEPH SCHOFIELD, of Littleborough, in the county of Lancaster, Cotton Spinner and Fustian Manufacturer, and **EDMUND LEACH**, of Littleborough aforesaid, Manager of Cotton Spinners and Weavers, for certain improvements in looms for weaving various kinds of cloth.—Sealed March 18, 1840.

WILLIAM MALTBY, junior, of Mile End, Chemist, and **RICHARD CUERTON**, Brass Founder, of Percy Street, in the county of Middlesex, for improvements in extracting and concentrating the colour, tanin, and other matters contained in vegetable and animal substances.—Sealed March 18, 1840.

SIR WILLIAM BURNETT, of Somerset House, in the county of Middlesex, Knight, Commander of the Royal Hanoverian Guelphic Order, for improvements in preserving animal, vegetable, woollen, and other fibrous substances from decay.—Sealed March 25, 1840.

PETER LOMAX, of Little Bolton, in the county of Lancaster, Weaver, for certain improvements in looms for weaving.—Sealed March 26, 1840.

PETER BANCROFT, of Liverpool, in the county of Lancaster, Merchant; and **JOHN MACINNES** of the same place, Manufacturing Chemist, for an improved method

of renovating or restoring animal charcoal, after it has been used in certain processes or manufactures to which charcoal is now generally applied, and thereby recovering the properties of such animal charcoal, and rendering it again fit for similar uses.—Sealed April 6, 1840.

WILLIAM HUNT, of Portugal Hotel, Fleet Street, in the city of London, Manufacturing Chemist, for improvements in the manufacture of potash and soda and their carbonates.—Sealed April 11, 1840.

THOMAS ROBINSON WILLIAMS, of Cheapside, in the city of London, Gentleman, for certain improvements in the manufacture of woollen and other fabric or fabrics, of which wool or fur form a principal component part, and in the machinery employed for effecting that object.—Sealed April 11, 1840.

HENRY PHILIP ROUQUETTE, of Norfolk Street, Strand, in the county of Middlesex, Merchant, for a new pigment. Communicated by a foreigner residing abroad.—Sealed April 18, 1840.

WILLIAM STONE, of Winsley, in the county of Wilts, Gentleman, for improvements in the manufacture of wine.—Sealed April 20, 1840.

PIERRE AUGUSTE DUCOTE, of No. 70, Saint Martin's Lane, in the county of Middlesex, Lithographer, for certain improvements in printing china, porcelain, earthenware, and other like wares; and for printing on paper, calicoes, silks, woollens, oil-cloths, leather, and other fabrics; and for an improved material to be used in printing.—Sealed April 20, 1840.

JOHN INKSON, of Ryder Street, St. James's, in the county of Middlesex, Gentleman, for improvements in apparatus for consuming gas for the purposes of light. Communicated by a foreigner residing abroad.—Sealed April 20, 1840.

JEAN FRANCOIS VICTOR FABIEN, of King William Street, in the city of London, Gentleman, for improve-

ments in rotary engines to be worked by steam or other fluid. Communicated by a foreigner residing abroad.—Sealed April 21, 1840.

THOMAS AITKEN, of Chadderton, in the county of Lancaster, Manufacturer, for certain improvements in the machinery or apparatus for drawing cotton and other fibrous substances.—Sealed April 22, 1840.

MATTHEW UZIELLI, of King William Street, in the city of London, Merchant, for certain improvements in the arrangement and construction of ship's-hearths or apparatus for cooking, and for obtaining distilled or pure water from salt or impure water. Communicated by a foreigner residing abroad.—Sealed April 22, 1840.

NOTICE OF EXPIRED PATENTS.

(Continued from p. 230.)

HUGH EVANS, Harbour Master, of the port of Holyhead, North Wales, for a method or methods of rendering ships and other vessels, whether sailing or propelled by steam, more safe in cases of danger by leakage, bilging, or letting in water, than as at present constructed.—Sealed February 7, 1826.—(*For account of specification, see Repertory, Vol. 3, third series, p. 375.*)

WILLIAM CHAPMAN, of Newcastle-upon-Tyne, Civil Engineer, for improved machinery for loading or unloading of ships, vessels, or craft.—Sealed February 7, 1826.—(*For account of specification, see Repertory, Vol. 3, third series, p. 369.*)

(To be continued.)

LIST OF NEW PATENTS.

CLAUDE JOSEPH EDMEE CHANDRON JUNOT, of Brewer Street, Golden Square, Operative Chemist, for certain improved processes for purifying and also for solidifying tallows, grease, oils, and oleaginous substances.—Sealed March 30, 1840.—(*Six months.*)

HENRY MARTIN, of Morton Terrace, Camden Town, for

improvements in preparing surfaces of paper.—Sealed March 30, 1840.—(*Six months.*)

WILLIAM NEALE CLAY, of Flimby, Cumberland, Gentleman, for improvements in the manufacture of iron.—Sealed March 31, 1840.—(*Six months.*)

JOHN LEBERECHE STEINHAUSER, of Upper Islington Terrace, Gentleman, for improvements in spinning and doubling wool, cotton, silk, and other fibrous materials. Communicated by a foreigner residing abroad.—Sealed March 31, 1840.—(*Six months.*)

PETER BANCROFT, of Liverpool, Merchant, and **JOHN MAC INNES**, of the same place, Manufacturing Chemist, for an improved method of renovating or restoring animal charcoal, after it has been used in certain processes or manufactures to which charcoal is now generally applied, and thereby recovering the properties of such animal charcoal, and rendering it again fit for similar uses.—Sealed March 31, 1840.—(*Six months.*)

CHARLES CUMMINS, of Leadenhall Street, Chronometer Maker, for certain improvements in barometers and sympiesometers.—Sealed April 2, 1840.—(*Six months.*)

JAMES SPREAD CROSLAND, of Leeds, Engineer, for certain improvements applicable to locomotive and other steam-engines.—Sealed April 2, 1840.—(*Six months.*)

THOMAS SMEDLEY, of Holywell, county of Flint, Gentleman, for improvements in the manufacture of tubes, pipes, and cylinders.—Sealed April 4, 1840.—(*Six months.*)

HARRISON BLAIR, of Kearsley, Lancaster, Chemist, and **HENRY HOUGH WATSON**, of Little Bolton, Chemist, for an improvement or improvements in the manufacture of sulphuric acid, crystallized soda, and soda ash, and the recovery of a residuum or residuums applicable to various useful purposes.—Sealed April 6, 1840.—(*Six months.*)

RICHARD BEARD, of Egremont Place, New Road, Gentleman, for improvements in printing calicoes and other fabrics. Communicated by a foreigner residing abroad.—Sealed April 6, 1840.—(*Six months.*)

EDWARD THOMAS BAINBRIDGE, of Park Place, Saint James's, Gentleman, for improvements in obtaining power.—Sealed April 13, 1840.—(*Six months.*)

THOMAS YOUNG, of Queen Street, in the city of London, Merchant, for improvements in lamps.—Sealed April 13, 1840.—(*Six months.*)

JAMES CALDWELL, of Mill Place, Commercial Road, Engineer, for improvements in cranes, windlasses, and capstans.—Sealed April 15, 1840.—(*Six months.*)

JOHN GOLD, of Etna Glass Works, Birmingham, Glass Manufacturer, for improvements in the manufacture of decanters and other articles of glass.—Sealed April 15, 1840.—(*Six months.*)

WILLIAM PORTS, of Birmingham, Brass Founder, for certain apparatus for suspending pictures and curtains.—Sealed April 15, 1840.—(*Six months.*)

LOUIS AUGUST DE ST. SYLVAIN BARON DE LOS VALLES, of Nottingham Street, Mary-le-bone, for certain improvements in cleansing, decorticating, purifying, and preserving corn and other grain. Communicated by a foreigner residing abroad.—Sealed April 15, 1840.—(*Six months.*)

WILLIAM GRIMMAN, of Camden Street, Islington, Modeler, for a new mode of wood paving.—Sealed April 15, 1840.—(*Six months.*)

JOSEPH WHITWORTH, of Manchester, Engineer, for certain improvements in machinery or apparatus for cleansing and repairing roads or ways, and which machinery is also applicable to other purposes.—Sealed April 15, 1840.—(*Six months.*)

THOMAS ROBINSON WILLIAMS, of Cheapside, Gentleman, for certain improvements in obtaining power from steam and elastic vapours or fluids, and for the means employed in generating such vapours or fluids, and also for using these improvements in conjunction with distillation or evaporation, and other useful purposes.—Sealed April 15, 1840.—(*Six months.*)

WILLIAM UNSWORTH, of Derby, Silk Lace Manufac-

turer, for an improved tag for laces.—Sealed April 16, 1840.—(*Six months.*)

SAMUEL WILKS, of Darleston, Stafford, Iron Founder, for improvements in the manufacture of vices.—Sealed April 16, 1840.—(*Six months.*)

WILLIAM HENRY BAILEY WEBSTER, of Ipswich, Surgeon, R. N., for improvements in preparing skins and other animal matters for the purpose of tanning, and the manufacture of gelatine.—Sealed April 16, 1840.—(*Six months.*)

SAMUEL MARLOW BANKS, of Bilston, Stafford, Gentleman, for improvements in the manufacture of iron.—Sealed April 16, 1840.—(*Six months.*)

ROBERT COOPER, of Petworth, Gloucester, Gentleman, for improvements in ploughs.—Sealed April 16, 1840.—(*Six months.*)

FRANCIS MOLINEUX, of Wallbrook Buildings, London, Gentleman, for improvements in the manufacture of candles, and in the means of consuming tallow and other substances for the purposes of light.—Sealed April 23, 1840.—(*Six months.*)

ELIJAH GALLOWAY, of Manchester Street, Gray's Inn Road, Engineer, for improvements in steam engines, which are also applicable to engines for raising and forcing fluids.—Sealed April 23, 1840.—(*Six months.*)

JONATHAN SPARKE, of Langley Mills, Northumberland, Agent, for certain improved processes or operations for smelting lead ores.—Sealed April 23, 1840.—(*Six months.*)

JOHN WHITE, of Manchester, Engineer, for certain improvements in vices.—Sealed April 23, 1840.—(*Six months.*)

JAMES MALCOLM RYMER, of Henrietta Street, Civil Engineer, for certain improvements in castors for furniture, such improved castors being applicable to other purposes.—Sealed April 23, 1840.—(*Six months.*)

THE
REPERTORY
OF
PATENT INVENTIONS.

No. LXXVIII. NEW SERIES.—JUNE, 1840.

*Specification of a Patent granted to JOSEPH WEBB, of
Huddersfield, in the County of York, Manufacturer,
for Improvements in Machinery for Raising the Pile
of Woollen and other Cloths.*—Scaled August 1, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso,
I, the said Joseph Webb, do hereby declare the nature of
my said invention, and the manner in which the same is to
be performed arefully described and ascertained, in and by
the following statement thereof, reference being had to
the drawings hereunto annexed, and to the figures and
letters marked thereon (that is to say) :—

My invention relates, first, to that part of the process
of raising the pile on woollen cloths, which consists in
producing an equal damping of the cloths in order to their
being evenly and equally raised ; and,

Secondly, my invention relates to improvements in gig-
mills or machinery for raising the pile on woollen and
other cloths ; and in order to give the best information in
my power, I will proceed to describe the drawings
hereunto annexed.

No. LXXVIII.—VOL. XIII. T T

Description of the Drawings.

In raising the pile on woollen cloths it is of the greatest importance that the cloths should be evenly and equally damped, otherwise the act of raising, whether by teasels or wire-cards will cause the surfaces most damped to raise more readily than those parts of the surfaces less damped, and thus produce an inequality of raising to the general surfaces of cloths which are operated on.

Fig. 1, represents a side elevation of a machine for damping woollen cloths about to be operated on by the raising process.

Fig. 2, is an end view of the machine. A, A, is the framing of the machine the nature of which is clearly shewn in the drawing. B, is a bed or platform on which the cloth is spread and by which it is supported in its progress through the machine. C, C, are three pipes, each perforated with a series of small holes so as to produce a series of small jets of water, and one or more of these pipes may be used according to the degrees of damping it is desired to give to any particular cloth passing through the machine. D, is a roller, over which the cloth first passes. E, is a roller by which the cloth is drawn through the machine; this roller is covered with felt or woollen cloth, and the axis of the roller, F, receives motion by a strap or band or other convenient means from a steam-engine or other power, and on the axis of the roller, E, is affixed the cog-wheel, G, which takes into and drives the cog-wheel, H, on the axis of which is affixed two cranks, I, to which are attached the connecting-rods, J, the other ends of the connecting-rods being connected to the sliding-bars, K, one on each side of the machine; hence when the machine is in motion, the bars, K, which are guided in staples, will move to and fro, and by such means fold the cloth as it comes through the machine, the throw of the cranks being regulated according to the size of the fold which it is wished to obtain. The two bars, K, carry two

rollers, *k*, *k*, which turn easily in their bearings, and the cloth passing between the rollers, *k*, will be moved to and fro and thereby folded as it descends from the roller, *e*, as will readily be understood on examining the drawing. *l*, is a roller which rests on the cloth which is passing over the roller, *e*, and distributes and regulates the moisture; this roller, *l*, is hollow, and has a jet of water thrown into it at one end, it is pierced with a number of holes and is covered with felt or woollen cloth, that is kept moist by the means aforesaid, and the axis of this roller moves freely in the bolts for that purpose.

I will now proceed to describe the second part of my invention.

Fig. 3, represents a right hand end view of a gig-mill, or machine for raising the pile on woollen and other cloths, constructed according to my invention.

Fig. 4, is a left-hand end view thereof.

Fig. 5, is a front view ; and,

Fig. 6, is a plan of some of the parts which relates to the cross dressing or raising. In each of these figures the same letters indicate similar parts. *a*, *a*, is the framing of the machine, the nature of which is clearly shewn in the drawings. *b*, is the front raising cylinder ; and *c*, is the back raising cylinder, the axes of which respectively turn in suitable bearings carried by the side framings of the machine. These cylinders, *b* and *c*, are arranged for raising by teasels, as is well understood, but it is evident that cylinders may be used which work with wire-cards, as is also well understood, and forms no part of my invention, nor does the placing of two gig-cylinders, one behind the other, form any part of my invention, unless combined with suitable gearing, or apparatus to cause such cylinders when placed one behind the other to revolve in such manner as both to raise the cloth (passing through the machine) in the same direction and also being capable of raising the cloth passing through the machine in opposite directions at the same time ; and I would

remark, that I am aware that double machines or gig-mills for raising the pile on woollen cloth have before been used with the cylinders working both at the same time, but one above the other, by which much inconvenience is experienced, owing to the great height of the machine; and I would also remark that I am aware that a machine and perhaps machines have been made having two cylinders, one behind the other, but so arranged that only one cylinder acted at one time, thus only performing the work of a single gig-mill though taking the room of a double machine. *d*, is the main or driving shaft, which turns in suitable bearings at the right hand end of the machine, at *e, e*; this shaft receives motion by a strap or band, or other means, from a steam-engine, or other power, as is well understood by machine-makers. *f, f*, are two bevelled toothed-wheels, one affixed on each of the axes of the gig-cylinders. *g*, is a bevelled toothed wheel, affixed on the driving-shaft, *d*; the wheel, *g*, taking into and driving the wheel, *f*, affixed on the axis of the front gig-cylinder, and by this means rotatory motion is communicated to the front gig-cylinder. *h*, and *i*, are two bevelled toothed-wheels on the driving shaft, *d*, and which are turned there; but are capable of sliding along that axis, in order that either the wheel, *h*, or *i*, may take into and drive the wheel, *f*, affixed on the axis of the back gig-cylinder; by this means the back gig-cylinder may be caused to turn in such manner as to raise the cloths passing through the machine, in the same direction as they have been raised by the front gig-cylinder, or reverse the direction of the raising, as will readily be understood on examining the drawing, aided by the description herein given. The wheels, *h, i*, are connected together, either by bolts or by a tube, embracing the main or driving shaft; and there is a feather or projection on the main or driving shaft, as is well understood by machinists, in order to cause wheels, *h*, and *i*, to move round with the driving shaft, yet allow of the wheels sliding along that

shaft. *j*, is a forked lever, moving on a fulcrum at *j'*; this forked lever embraces the grooved nave or boss of the wheel *i*, and *k* is a screw, by which the lever, *j*, can be moved towards the back or front of the machine, and thus put the wheels, *h*, and *i*, into and out of gear, with the wheel, *f*, of the backgig-cylinder. *l, l*, are two sloping boards, with a gutter at their lower ends; by this means any water falling on the boards will be carried clear of the machine. *A, A*, is the line of the floor on which the machine stands, and it is important that the machine should be only a convenient height for a workman to see the cloth as it is going into the machine, and be within reach when passing through the machine; and at the same time it is desirable that the cloths should pass downwards and pass under the machine; and in order to accomplish these objects, I have so arranged the machine, that the scray or surface, *m, m*, on which the cloth moves, passes below the floor on which the machine is placed, and on which the workman stands when attending his work; by this arrangement and mode of applying the scray or such like surface, I obtain great facilities in carrying on the operation of raising the pile of woollen and other cloths; and I would remark that this part of the invention is equally applicable in double or single machines, and whether both gig-cylinders revolve at the same time or not. The pink line indicates the course of the cloth under operation. *n, n*, are two rollers, over and under which the cloth first passes before coming to the front gig-cylinder; and these rollers can be varied in their position by the necks or axes which carry the frames, *n'*, being placed more vertical or horizontal, and set in any position by means of set screws, which are turned by the handles, *n''*; and the cloths, in passing over the front gig-cylinder will be caused to bear on more or less of the surface of that cylinder, according as these rollers, *n*, are raised or lowered by means of the cog-wheels, *o*, on the axis, *o*, such cog-wheels taking into and working in segment or curved racks, *o'*, which carry

the axes of the frame of the rollers n , and o^3 is a plate on one end of the axis, o^1 , which has a click or catch, o^2 , by which the axis, o^1 , can be held in any desired position, and such is consequently the case in respect to the rollers, n, n . The axis, o^1 , being turned by means of the cranked handle, o^4 , as will readily be understood by examining the drawing; from the front gig-cylinder the cloths pass partly around the rollers, p , and q , which receive motion by means of a cog-wheel affixed on the left hand end of the axis of the front gig-cylinder, which takes into and drives the intermediate cog-wheel, p^1 , which drives the cog-wheel, p^2 , which is on the axis of the roller, p , and the rollers, p , and q , are geared together by means of cog-wheels on their axes, as is clearly shewn in the drawing. The cloth from the front gig-cylinder passes over certain apparatus for cross raising of the pile, as hereafter explained, and then under the roller, r , which is capable of being raised or lowered by similar apparatus to that described in respect to the rollers, n , as above described, and the cloth from the back gig-cylinder is conveyed off by means of the similar rollers, p , and q , to those before described; and the rollers, p , and q , of the back gig-cylinder, receive motion by means of a shaft or axis, s , which is actuated by means of a bevelled toothed-wheel, affixed on the axis of the roller, p , to the front gig-cylinder, such bevelled toothed-wheel taking into and driving a similar bevelled toothed-wheel on the axis, s , and in like manner by two bevelled toothed-wheels, one on the axis, s , and the other on the axis of the wheel, p , of the back gig-cylinder, all which is clearly shewn by the drawing at the right hand side of the machine.

I will now describe the apparatus for cross raising, which may or may not be used, according as the workman judges it desirable; and I would remark that I am aware that it is not new to cross raise cloths in a gig-mill, and this part of my invention only relates to the application of suitable means of adjusting the pressure of such cross

raising, in order to allow for the extra thickness of the selvages in respect to other parts of the cloth.

The machine is arranged for two widths of narrow cloths, to be passing through the machine at one time, side by side; and there are, therefore, four endless bands or straps of wire-cards one for each selvage, but if broad-cloth were being operated on, only two endless bands or straps of wire-cards would be necessary, or the four may be employed, and in such case only the outer ones would be adjusted to act suitably in the selvages. t, t , is a frame of four parallel bars which carry four frames each frame having two rollers, v , moving on the other axes, one to each frame passing through the bars, t , and become the driving axes of their rollers, and the points on which the frames, v^1 , are raised and lowered, as is shewn in the drawing, being carried by their respective frames, v^1 , and the rollers, v , move endless bands of wire-card, and in consequence of the frames, v^1 , being capable of movement up or down on their driving axes, the other ends of those frames, v^1 , can be raised or lowered, or be kept level, according as desired. u , is a shaft or axis receiving rotatory motion from the axis, s^1 , by means of a bevelled toothed-wheel, w , affixed thereon, which takes into and drives a bevelled cog-wheel, x , which turns on a suitable axis carried by the right hand end framing, and to the wheel, x , is affixed a cog-wheel, y , which takes into and drives a cog-wheel, z , on the axis, u , and on the axis, u , are two bevelled toothed-wheels which take into and drive similar bevelled toothed-wheels, affixed on the axes of some of the rollers, v , as is clearly shewn in the drawing at fig. 6. The endless bands or straps of wire-cards, (which should be of cards with Indian rubber back affixed on leather, or other suitable endless straps or bands,) move on guides, beds, or platforms, on the surface of the frames, * v , which can be raised or lowered, as follows, v^3 , are eccentrics under the frames, v^1 , which are capable of being turned round on their axes, and their axes have each a screw-wheel, v^3 , which receive motion by means of

an axis on shaft, v^4 , proceeding to the outer ends of the frame, t , and the axes, v^4 , have each a screw, v^5 , which takes into and drives its respective wheel, v^3 ; by this arrangement it will be evident, that supposing two narrow breadths of cloths are passing through the machine, that the ends, v^5 , of each of the frames, v^1 , can be raised out of the true horizontal line, and thus cause the endless bands of wire-cards to act only at and approaching to the selvages, and as the frames, v^1 , can be raised more or less at the pleasure of the workman, the endless bands of wire-card may be made to act upon a small portion near the selvages, or to operate upon the whole breadth of the cloth, but in case of broad cloth passing through the machine, the two inner bands of wire-cloth would work horizontally, and only the outer ends of the other two bands be elevated to take the selvages, and in case of using only two endless bands, they must be of a length sufficient to respectively operate on one half of the width of the cloth.

Having thus described the nature of my invention, and the manner in which the same is to be performed, I would remark that I make no claim to any of the parts separately nor combined other, than is herein particularly claimed as my invention. But what I claim is, first, the mode of more equally damping cloths by machinery, to facilitate and equalize the process of raising the pile on woollen cloths, as above described.

Secondly, I claim the mode of combining two gig-cylinders one behind the other, when so arranged as to work at the same time, as above described.

Thirdly, I claim the mode of applying the scrays or surfaces, on which the cloths under operation move, by causing it to be below the level of the floor, as above described.

Fourthly, I claim the application of suitable apparatus for cross-raising between two gig-cylinders, and I also claim the application of suitable apparatus to regulate the position of such cross-raising apparatus, in order to

accommodate the same to the raising under the selvages of the cloths, as above explained, however such apparatus for cross-raising may be employed.—In witness whereof, &c.

Enrolled February 1, 1840.

Specification of the Patent granted to WILLIAM ABBOTT, Junior, of Wyndham Place, in the County of Middlesex, Gentleman, for Improvements in the Manufacture of Felt.—Sealed August 1, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—*Now know ye*, that in compliance with the said proviso, I, the said William Abbott, do hereby declare the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

According to the ordinary mode now pursued for making felt, the hair or other materials employed is obtained in the form of what is called a bat, by the process of bowing, or otherwise, as is well understood, which bat is slightly pressed on by the workman by a surface of open basket-work, and the bat is then placed in a cloth in such manner as to enclose the bat on all sides and surfaces. The bat so prepared then undergoes the process of felting by the hands of the workman, he from time to time damping the fibres with water; and the process of felting consists in pressing on the surfaces with the hand, and from part to part of such surfaces, by which motion is communicated to the fibres, which is the cause of a creeping action taking place of the fibres amongst themselves, which causes them to interlock and intermat, such

process being carried on by the workman on a heated slab or bench of iron (kept hot by steam or other convenient means), the workman occasionally examining the progress of his work, and by holding the sheet under operation when taken out of the cloth before the light, he ascertains whether there are any thin places, and if there should be any, he places a quantity of hair or other fibre which he judges sufficient to make good such places, he then again places the partially prepared sheet of felt in the cloth, and proceeds, by pressing with his hands progressively over the whole surface, which is upwards, occasionally turning the sheet over to bring up the other surface, and this process is pursued till the required degree of felting is obtained. Now the principal object of this invention is to make sheets of felt from hair, such as are now made by hand, and are used in ship-building, and also in railways and for other purposes : but the invention is not confined to hair. I would remark, that I have been thus particular in calling attention to the process now pursued, in making sheets of felt by hand, by enveloping the bat under operation in a cloth, and working by hand pressure, as is well understood, because my invention consists in the application of a system of rollers, to press and work the bats of fibres within or between such cloths, in substitution of the hand pressure and working above spoken of, and which is well understood; and it should be stated that, according to my invention, the process is to be carried on, according to the well known means now pursued, up to the time that the bat of hair or other fibres is enveloped in a cloth, when it is to undergo a process of rolling and pressure by rollers, on a similar heated surface to that now employed, and during such process of pressure and rolling, the workman will, from time to time, moisten the cloths, and will turn the bat over from side to side, and will examine the sheet of felt as it proceeds, in order to ascertain whether there are any inequalities, and in fact he will in all things, excepting using roller pres-

sure, in place of hand pressure, pursue like means to those now resorted to in making felt by hand.

Description of the Drawing.

Fig. 1, is a plan of a series of grooved rollers, *a, a*, of wood, the axes of which turn in the quadrangular frame, *b*; and, *c, c*, are the handles by which the workman moves the frame of rollers to and fro, on the upper surface of the cloth, containing the bat of fibres.

Fig. 2, is a side view of fig. 1; and

Fig. 3, an end view of fig. 1.

In using this apparatus the workman places the cloth containing the bat of fibres on to a table or bench, similar to that now employed, properly heated; and he stretches a cotton or other surface of cloth over the cloth containing the fibres; and the object of such second cloth so stretched over, is to prevent the bat and its cloth being irregularly acted on at its edges, which are apt to turn and move up, unless a cloth is stretched over; and for this purpose I have pins or other means of fixing the covering cloth at the sides, so as not to give way when rolling with the rollers. The workman, from time to time, turns the bat under operation, and examines the progress of felting, in order to make good any thin places, and he applies water or other fluid, as usually employed, from time to time, as the felting proceeds, and as is usually done in performing the process of felting by hand. The workman simply moves the frame, *b*, to and fro, in place of the hand pressure formerly applied. In other respects, the process of felting hair or other fibres, is to be pursued as heretofore.

Fig. 4, shows an elevation in section.

Fig. 5, an end view; and

Fig. 6, a plan of a similar system of rollers to be worked by machinery.

The frame of rollers, *a, a, b, b*, are similar to what are shewn in figs. 1, 2, and 3, excepting that in this case I

prefer them to be of iron. *c, c,* is the framing of the machine. *d,* is the heated surface on which the enveloped bat of hair or other fibre is to be placed; and, *e,* is the steam-pipe for heating the surface, *d.* At the two sides there are guide plates, *f, f,* for the frame of rollers, there being friction rollers or wheels, *g,* carried by the frame, *a,* which work against the guide surfaces, *f, f.* On the upper surface of the frame, *a,* is affixed a toothed rack, *h,* having handles, *i,* by which the workmen can move it along off the bat under operation, when required, into the rack, *h.* A cog-wheel, *j,* works on such wheel, being affixed on the shaft or axis, *k,* which turns in suitable bearings at top and bottom. The wheel, *j,* receives motion from a steam-engine or other power, by a correcting rod, *l,* which takes hold of a crank-pin, *m,* and by such means, when motion is communicated to the correcting rod, it communicates motion to the wheel, *j,* giving it a motion on its axis, first in one direction, then in the other. But I would remark that the frame, *b,* may have a to and fro motion communicated thereto, by any other convenient means. In using the machine, the same description as given above, in respect to the hand-rollers, applies here. But I have found it desirable to have filling pieces of felt, or other material placed on the table or heated surface, at each end of the bat, in order to prevent the outer rollers descending, when they pass beyond the edges of the bat. And further, I prefer to have a cloth stretched from end to end of the table, over the enveloped bat, which prevents the edges or ends of the bat turning up after the rollers.

Having thus described the nature of my invention, and the manner of performing the same, I would remark, that I do not confine myself to the precise arrangement shewn or described for fixing motion to the frame of rollers, when actuated by mechanical power. And it should be stated, that I am aware that it is not new to employ rollers to press fibres together with the aid of adhesive mixtures, and thus produce a substitute for felt; in such case,

however, the fibres are not caused to move amongst themselves, in order to produce actual felting. And further, I am aware that a system of rollers has been before used and called planking machines, for completing the process of felting, and it has been proposed to felt suitable fibres together, simply by acting on a bat thereof, by means of rollers; but in such cases the bat has not been enveloped in cloth. I do not, therefore, claim the application of the pressure and rolling action of rollers generally; nor do I claim the placing of a bat of felting fibres between cloths, when such bat is felted by the simple operation of the hands of the workman. But what I claim is the mode of felting, by means of rollers on a surface, when the bat of fibres is enveloped in a cloth as above described.—In witness whereof, &c.

Enrolled February 1, 1840.

Specification of the Patent granted to JAMES VARDY, of Wolverhampton, in the County of Stafford, Gentleman, and MORITZ PLATOW, of Poland Street, Oxford Street, in the County of Middlesex, Engineer, for Improvements in Making Decoctions of Coffee and other Matters.—Sealed August 17, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, we, the said James Vardy, and Moritz Platow, do hereby declare the nature of our said invention and the manner in which the same is to be performed are fully described and ascertained in and by the following statement thereof, reference being had to the drawing annexed and to the figures and letters marked thereon (that is to say):—

This invention relates to a peculiar construction of apparatus for making extracts of coffee and other matters, whereby the water is caused to boil and pass out of the

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vessel by the pressure of steam within, and in passing out of the vessel, the water enters into another vessel containing a straining or filtering medium and mixes with the coffee, tea, or other matter placed in such vessel. The heating means being then removed, the steam in the lower vessel becomes condensed and thereby produces a partial vacuum under the filtering or straining medium, and the atmosphere pressing on the water, combined with coffee or other matter in the upper vessel causes it to filter through into the lower vessel with considerable quickness, and thus is an extract of coffee or other matter produced with great advantage both as to the quality and as to the means of making the same.

Description of the Drawing.

The drawing represents an apparatus constructed according to the invention.

Fig. 1, being an external view ; and,

Fig. 2, a section of a coffee-pot or vessel for making extracts ; *a*, being a cylindrical vessel which is placed within the outer case, *b*, the object of the outer case being to receive a spirit lamp in order to heat the vessel, *a*, but it will be evident that the vessel, *a*, may be heated in any other way, but the arrangement shewn is convenient where it is intended to stand on a table. *c*, is an upper vessel which has a descending tube, *d*, passing into the vessel, *a*, and the vessel, *c*, is affixed to the vessel, *a*, by means of a screw, or other means which will be convenient for readily separating the vessels, *a* and *c*, at the point, *d*. At the upper part of the tube, *d*, there is a bridge to receive a screw by which the perforated plate is fastened. *e*, is a perforated plate at the lower part of the vessel, *c*. *f*, is a small hole through the upper part of the tube, *d*, the object of this hole is to allow of the passage of the air from out of the vessels, *a*, up into the vessel, *c*, otherwise the air expanding would force the water into the vessel, *c*, before it boiled ; and we would remark that the construction

of the means of permitting the air to escape may be varied, provided the mode resorted to will admit of the passing off of the heated air and yet not allow of the steam flowing freely off when the air has been driven off. It should, however, be understood that this hole is small so as to prevent the steam, as quickly as it is generated, from passing off in that direction, hence the pressure of the steam, when the water boils, causes the water in the vessel, *a*, to rise up the tube into the vessel, *c*, and mix with the coffee, tea, or other matter contained therein, and thus extract matter therefrom, and so soon as the heat is removed, a vacuum will be produced in the vessel, *a*, and the pressure of the atmosphere will cause the liquor to be filtered through the perforated plate; and the female screw is formed with a vertical groove which will allow of the air passing out from the vessel, *a*, when water is running into the vessel *a*, from the vessel, *c*, but when the screws of the vessels, *a* and *c*, are screwed tight together, the felt washer placed at the joint will keep the parts air-tight. *g*, is a spring made of brass by which in the event of the filter, *e*, being stopped, the pressure of steam would lift the filter and prevent accident.

Having thus explained the mechanical arrangements of parts, we will describe the mode of using the same. A quantity of water according, to the quantity of extract of coffee required to be made, is to be put into the vessel *c*, which vessel we generally make of glass, but it may be of other suitable material. The upper part or vessel, *c*, is then to be slightly unscrewed, and the water in *c*, will pass into the vessel, *a*. When the vessels, *a* and *c*, are to be screwed tightly together, a quantity of ground coffee, or tea, or other matter, according to the strength of extract desired to be obtained, is to be put into the vessel, *c*, on to the perforated plate *e*. The spirit lamp, or other means of heating, being placed under the vessel, *a*, or on that vessel being otherwise heated, steam is generated in such manner as to produce pressure on the inside of the vessel,

a, which will cause the boiling water to rush up through the pipe or tube, *d*, through the perforated plate, or other filtering or straining medium, *e*, and mix with the coffee or other matter and partly fill the vessel, *c*. The spirit lamp is then to be removed, or the vessel, *a*, to be removed, from the source of heat ; when heated by other means the steam within the vessel, *a*, will quickly condense and a partial vacuum will be obtained in the vessel, *a*, and the outer atmosphere pressing towards such vacuum will cause the extract in the vessel, *c*, to be quickly filtered or strained through the plate, *e*, into the vessel, *a*, when the extract of coffee, or of the other matter, will be ready to be drawn off by the cock or tap, *f*.

Having thus explained the nature of the invention, and the manner of using the same, we would remark that the shapes of the vessels, *a* and *c*, may be varied according to taste, and the filtering or straining material may be also varied. But what we claim is, first, the mode of combining the vessels, *a* and *c*, with the tube, *d*, and its perforation or outlet, *f*, as above described ; and the mode of affixing the filtering surface or plate, *e*, by a screw as above described.

Secondly, we claim the mode of combining the vessels, *a* and *c*, by screws, having a vertical groove, and employing a felt washer to the joint as above described.—
In witness whereof, &c.

Enrolled February 17, 1840.

Specification of the Patent granted to WILTON GEORGE TURNER, of Park Village, Regent's Park, Doctor in Philosophy, and HERBERT MINTON, of Longfield Cottage, in the Parish of Stoke-upon-Trent, in the County of Stafford, Manufacturer, for an Improved Porcelain.—Sealed June 22, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, we, the said Wilton George Turner and Herbert Minton, do hereby declare that the nature of our invention consists in producing the biscuit prepared for glazing, of a much softer and more porous nature, by subjecting it to a much less degree of heat than heretofore used for that purpose, and when the glaze has been put upon the biscuit so produced, in subjecting the said porous biscuit to a much greater degree of heat than is usual for the mere purpose of glazing, and effecting the glazing at the same time. And in further compliance with the said proviso, we, the said Wilton George Turner and Herbert Minton, do hereby describe the manner in which our said invention is to be performed, by the following statement thereof (that is to say):—

A quantity of kaolin, or Cornish clay, is to be so long agitated with water, that the whole is brought to the consistence of cream; it is then passed through a fine sieve, by which all foreign matter as well as the coarser portions are separated. A gallon, or any other convenient measure of this cream-like liquid is evaporated to dryness, and the residue weighed, from which the quantity of solid matter, in any number of gallons of the cream of the liquid may be calculated. A portion of Dorsetshire, or similar clay, is treated in a similar manner. To so many gallons of the first cream-like liquid, as shall contain one hundred pounds of solid kaolin, and of the second, as shall contain five

pounds of a solid Dorsetshire clay, are added twenty pounds of a pure feldspar, ground to an impalpable powder, the whole, after long continued stirring, to effect as intimate an admixture as possible, is passed through a fine silk lawn sieve: this sifting is repeated three times. A perfect admixture being thus effected, the mixture must next be dried until it is reduced to a plastic clay; this may be done by the common process of drying it upon the slip-kiln: the clay being sufficiently dried, is manufactured into various articles, exactly as the common earthenware of this country. The process of fixing, is, however, somewhat different, and is most economically conducted in an oven of three stories, or three chambers, one above the other, as shewn in the drawing annexed.

Description of the Drawing.

In this drawing, fig. 1, is a sectional elevation of such a three-storied oven.

Fig. 2, a ground plan of the basement or lower chamber, A.

Fig. 3, a plan of the first story, or chamber, B; and,

Fig. 4, a plan of the second, or upper chamber, C, by which it will be seen, that the heat passes up from the chamber, A, to the chamber, B, through pipes, or chimnies, raised above the floor, whereby the heat is rendered less than it would otherwise be, in that chamber. By reference to the plans, it will also be seen, that the apertures for the passage of the heat from chamber to chamber, are not exactly over each other, but purposely mismatched, so that the heat is necessarily drawn across the upper chambers in its passage upwards, and thus wanders more thoroughly among the saggars. The first fire to which the green ware is exposed, should not be so strong as to cause any sensible contraction of the green ware, but be merely sufficient to harden it into a kind of bisque, so far as to enable the workman to handle it freely, and to prevent it from again softening, when introduced into water,

although it remains very porous, and highly absorbent, and for this purpose, the green ware should be baked, or fired, first in the chamber, B. It is thus brought into the best state for receiving the glaze, which must be composed on this principle, that it does not flow into a perfect glass, until the bisque is fired up, and forms a perfect porcelain, and must be more or less fusible in proportion to the hardness of the body. A number of different compositions will answer this purpose. The following is an example of one glaze, which may be advantageous, used upon the body above specified. This glaze is composed of 28 parts of common flint, calcined and ground in water, as used in the potteries for various purposes, or, instead thereof, the same quantity of Lynn sand, or of finely ground silica, in any shape it can be procured pure, 8 parts of the soft bisque, herein before described, fired up, and then broken, and finely ground in water, 8 parts of gypsum, of the purest sort, finely ground in water, 18 parts of kaolin, or Cornish clay, previously prepared by mixing with water and sieving, the several above mentioned ingredients to be ground separately, and separately passed through a silk lawn sieve of the finest sort. The above ingredients are then to be completed and dried separately, on a kiln, or in any other convenient method, and weighed, then put together into a large quantity of water, and thoroughly mixed by stirring; and to effect this mixture more completely, the whole, when mixed together, must be passed twice through a silk lawn sieve of the finest sort; the workman while passing the glaze through the sieve, must keep the liquid in the vessel from which it is taken, to pass through the sieve agitated, so as to preserve a complete mixture of the materials, and prevent a subsidence of the heavier particles. The materials should then be allowed to subside, and the superfluous water drawn off, leaving the glaze of about the consistency of cream, in which the bisque ware is to be dipped. The glaze being thus put upon the biscuit ware by dipping, and the biscuit

ware being placed in saggars, made in manner hereinafter described, may be fired up in the chamber, A, which should not be of a greater height than about 6 feet, inside measurement; because if the bungs much exceed 6 feet in height, the lower saggars are liable to be crushed, by the superincumbent weight. When placed in the chamber, A, the fire should be kept at a great heat, until trials drawn from the oven in the usual way, shew that the glaze has flowed smoothly and uniformly, the strong heat firing up the body, as it is called, and effecting the glazing at the same time. Now it is evident that the saggars used for the foregoing purpose, must be made to stand the strong heat applied to the ware, as before described, which ordinary saggars would not, and they should therefore be made in the following manner:—they should not be composed of the common Staffordshire marl, as is usual, but made of the following materials, in the following proportion, that is to say, six hundred weight of common Dorsetshire clay, mixed with four hundred weight and a quarter of grog, which is formed with setters, crushed between rollers, commonly called a grog mill. The grog should not be too fine, the best sort is that which is obtained from setters, or from saggars, made after this process, and then passed through a sieve, in which the interstices will admit a common pea to pass through. These ingredients are intimately mixed, to the consistency of the clay generally used in the formation of common saggars, and used in the same manner.

Now whereas we claim as our invention the improved porcelain aforesaid, that is, to porcelain made as aforesaid, the body of which has been fired up, as aforesaid, at the same time that the glazing has been perfected, or porcelain made as aforesaid, the glazing of which has been perfected, at the great heat aforesaid, after the body has been previously fired up by a similar heat. And such our invention, being to the best of our knowledge, entirely new, and never before used in that part of Her Majesty's United

Kingdom of Great Britain and Ireland, called England, Wales, and the Town of Berwick-upon-Tweed; we do hereby declare this to be our specification of the said invention; wherefore we do hereby claim and maintain exclusive right and privilege to our said invention.—In witness whereof, &c.

Enrolled December 22, 1839.

Specification of a Patent granted to WILLIAM HAWES, of Old Barge House, Christchurch, in the County of Surrey, Soap Manufacturer, for Improvements in the Manufacture of Soap, parts of which Improvements are also applicable to Preparing Tallow for the Manufacture of Candles.—Sealed December 12, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c., &c.—
Now know ye, that in compliance with the said proviso, I, the said William Hawes, do hereby declare that the nature of my said invention, and the manner in which the same is performed, are fully described and ascertained in and by the following statement thereof; reference being had to the drawings hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

In making soap according to the modes now in use, combining of tallow or other fatty matters with the alkali is effected in a copper by boiling, and saponification goes on during such boiling process. Now my invention relates to a mode of making soap by intimately combining and mixing the ingredients of soap by mechanical means without boiling, thus producing a saponification of the tallow or other fatty matters employed at a low temperature, and without submitting the materials for soap-making to that high degree of heat, which heretofore has been the means of mixing and bringing the particles of tallow, and the alkaline ley, into intimate contact to effect their combination or saponification; by which means I

am enabled to obtain a more beneficial result, and at a less expenditure of fuel; and in order to give the best information in my power, I will proceed to describe the process pursued by me, and which I have found fully to answer.

Description of the Process.

I take any given quantity of tallow, say two and a half tons, and having melted it, keeping the temperature as low as possible, I mix it with the quantity of alkaline ley, which is required completely to saturate the tallow, to convert into soap; and such mixing I perform by mechanical means, and the apparatus or machinery I employ is hereafter described. I use the ordinary ley of soap-boilers, preferring that made from the strongest and purest alkali. The saponification of the tallow or other fatty matter, may be ascertained by the absorption of or combination of the tallow, oil, or other fatty matter, with the ley, care having been taken in the first instance to use sufficient quantity thereof, or about twenty gallons of ley made from the strong alkali, above referred to, and of the specific gravity of 1.125 water, being unity, or a smaller quantity if the specific gravity is higher, (that being determined by the quantity of free or caustic alkali in the ley) to every one hundred pounds of tallow. It is necessary to state that various descriptions of fatty matters, require different proportions of alkali to convert them into soap, and that provided there is sufficient, the quantity is immaterial, and the method of ascertaining the quantity of alkali in the ley, being that now generally in use and well known to soap manufacturers. This combination of the tallow or other fatty matters, and the ley may be made in one of the ordinary coppers now in use by soap makers, with the addition of a machine to produce their intimate admixture, and the minute division of the tallow. The apparatus by which this may be effected I have represented in the annexed drawing, and consists of an upright shaft,

A, fig. 1, from which arms, *a, a, a, a, a*, radiate to the sides of the copper, B. This shaft may be either temporarily or permanently fixed in the copper, and may be made of wood or iron. The mode of fixing the apparatus and the materials used first, will depend on the nature of the copper and the convenience of the manufacturer. An oscillating motion or rotatory motion may be given to the shaft and connected arms by any of the ordinary methods of communicating mechanical power, or a cylinder may be employed with a shaft, *c*, fig. 2, passing through it horizontally, and from which arms, *c, c, c, c, c, c*, may radiate, when a rotatory motion will thoroughly incorporate the fatty matter and the ley. The size of the cylinder for two and a half tons of tallow will be about six feet in diameter, and twelve feet in length. It must be provided with convenient doors, *d*, for charging and emptying, which are shewn in the accompanying drawing. Motion being communicated to the machine, and the copper having been previously charged with the tallow, the ley is to be gradually added thereto, and in a short time every particle of the fatty matter will be brought into intimate contact with alkaline ley, and by such means saponification will take place, or the ley may be put in first, and the tallow added gradually, though the mode first described will generally be found to be the best. This mechanical stirring process I continue for about three hours, or until the tallow appears completely saponified, which will be indicated by the mass thickening, and in this state the same is to be allowed to stand for some time, the time varying according to the quantity, and for a large quantity, three or four days may be required. And it should be remarked that in treating large quantities in this manner, the same is very liable to heat which should as much as possible be kept down.

Should a cylinder be employed, then immediately upon its being charged with either the ley or the tallow (the

tallow at a temperature just sufficient to keep it fluid,) the tallow or ley, as the case may be, may be pumped or run in, and motion given to the shaft and stirring apparatus, which being continued in a vessel of the size described from three to four hours, or less time if the mass becomes thick sooner, will ensure the perfect mixture of the materials, and prepare the tallow for saponification which is evinced by the evolution of heat. As the benefit of this process arises mainly from the saponification of the ordinary materials in a comparatively cold state, it is desirable, as soon as the mass thickens and the ley is absorbed, that the cylinder should be emptied and the contents turned into an ordinary copper, preparatory to their being finished and converted into yellow soap, by the addition of resin, or into mottled or white soap, by the operations of finishing leys as at present practised, and as is well known to every soap manufacturer.

By this transfer from the cylinder to the ordinary copper, time is allowed for the combination of the tallow and alkali to become, chemically speaking, perfect.

In the description of the process above given, I have generally spoken only of tallow, in order to prevent repetition of words, but it should be understood that the same description applies to oils, some of which will not require melting or warming, and other fatty matters usually employed in soap making. I would remark, that although I have given the description of the machine I employ for mechanically mixing of the tallow and alkaline ley, I do not confine myself thereto, as variations may be made therein, or other mechanical means may be resorted to, so long as an intimate mixing of the matters be effected, in order to the bringing of the particles of the tallow in intimate contact with the alkali, that saponification may take place without the application of boiling heat.

Having thus explained the nature of my invention, so far as it relates to the manufacture of soap, I would

remark that the invention is applicable to the saponification of tallow or other fatty matters for making candles. In saponifying tallow and other fatty matters as a preparatory process applicable to the making of candles, that process has been heretofore performed by boiling the fatty matters with lime in the state known as cream of lime, and the saponification and mixing has been performed by boiling. Now this part of my invention consists in mechanically mixing the alkali or lime employed with the tallow, without boiling, in the same manner as that above described, and thus producing a saponification of the tallow or fatty matter, which when so obtained is to be subsequently treated in like manner to like matters when mixed and saponified when using heat.

Having thus described the nature of my invention, I would have it understood that what I claim as my invention is, first, the mode of combining mechanically tallow, oils, or other fatty matters, and alkali for producing saponification in soap making, avoiding submitting the matters to that high degree of heat heretofore resorted to, in mixing the ingredients for saponifying tallow, or other fatty matters, in soap making, as above described; and,

Secondly, I claim, the mode of saponifying tallow, and other fatty matters (in preparing the same for making candles) by mechanically mixing the same with the alkali employed, as above described.—In witness whereof, &c.

Enrolled December 12, 1839.

Specification of a Patent granted to JOHN RAPSON, of Emmett Street, Poplar, in the County of Middlesex, Millwright and Engineer, for Improvements in Steering Ships and Vessels.—Sealed September 9, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said John Rapson, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

According to the ordinary construction of steering apparatus for ships and vessels, where wheels are used, the tiller-chain or rope is made fast, or directly connected, to the end of the tiller ; and the tiller-rope or chain, directly in connexion with the end of the tiller, performs a curve in working, according to the radius of the tiller ; hence in working the wheel, in order to steer a ship or vessel, much slack chain or rope has to be wound up, and the tiller, and consequently the rudder, may be said to be free, and not under control during the winding up of such slack of the chain or rope ; from this cause much inconvenience is suffered in the art of steering, owing to the rudder not being at all times in check, and readily moved to and fro by every movement of the wheel, but, on the contrary, requiring considerable movement of the wheel before the tiller-rope or chain is tort : there is also the serious objection which arises from the man at the wheel being overcome by any sudden action on the rudder, which often causes the man to be thrown from the wheel with much force. Now the object of my invention is a mode of applying the tiller-ropes or chains, in such manner that they will at all times be tort, and the tiller and rudder will be constantly moved by any portion of movement of the wheel, thus avoiding the prejudicial conse-

quences of having to wind up a slack chain or rope, which is attached to the end of the tiller, and moves in a curve therewith, according to the radius of the tiller. In applying this, my invention, the arrangement of the tiller-ropes or chains may be suitably arranged for more or less power, according to the size of the vessel.

Description of the Drawing.

Fig. 1, represents a steering apparatus, constructed according to my invention.

Fig. 2, is a plan of fig. 1. This apparatus is of the simplest kind, to be used in such cases as do not require great power. *a*, represents one of the standards or frames, which carry the axis of the steering-wheel. *b*, is the steering-wheel, and its barrel, on which the chain or rope is wound on and off; these parts are similar to those in ordinary use. *c, c*, is the tiller-rope or chain, which is affixed to the sliding frame and socket, *d, d*, passes over the guide pulleys, *f, f*, and is affixed to, or takes three or four turns around, the barrel carried by the axis of the steering-wheel. The sliding frame, *d*, acts between the guides or plates, *e, e*, of wood, or other suitable material. The frame, *d*, carries a socket, through which the end of the tiller passes and slides easily, and the socket turns easily on its axis, which enter holes formed in the upper and under bars of the sliding frame, *d*, and the two bars of the sliding frame are bound together by screws and nuts, as are clearly shewn in fig. 1, of the drawing; and it will be evident that by this arrangement the tiller-rope or chain will at all times be taut, for the sliding frame will at all times move in a direct line, in place of moving in the curve performed by the end of the tiller; and in the moving of the sliding frame from side to side, the tiller will move freely through the socket, and thus will the tiller, and consequently the rudder, be in constant check and under the control of the man at the wheel, for he will no longer have to wind up the slack rope or chain, and the

rudder will be more instantly at work, for the wheel cannot be moved in either direction, without producing its immediate effect on the rudder, and the man will be for the most part relieved from the hazards consequent on the rudder's being suddenly acted on by a sea, which has often proved so serious when the rudder has been free during the winding up of the slack of the chain or rope.

Fig. 3, shows another modification of the same invention.

Fig. 4, being a plan of fig. 3.

In these figures the same letters indicate similar parts. In this case the rope or chain passes around two additional pulleys, *g, g*, which have each ratchets at their ends, into which the two palls, *h*, enter; and the object of introducing these pulleys, *g, g*, is to offer further security against any sudden striking of the rudder by the sea, being felt by the man at the wheel. In steering with this arrangement, the only difference from that above described, will be in the working of the pulleys, *g, g*, one or other of which will at all times be moving, whilst the other will be held still by its pall, and thus the chain or rope will have to be dragged over the surface of the stationary pulley. In these figures the construction of the guiding surfaces of the sliding frame is different in material, and the sliding frame and socket is somewhat different to that shewn at fig. 1. In the present case the socket only partly embraces the tiller, and the pin on which the socket moves, passes through the tiller. These variations are shewn with a view to my remarking, that I do not confine myself to the mode of making these parts, so long as the invention of applying the tiller-ropes or chains, in such manner as at all times to be tort, be observed.

Fig. 5, shews an elevation.

Fig. 6, a side view of elevation; and

Fig. 7, a plan of my invention, suitably arranged for obtaining power by a suitable arrangement of pulleys; and

Fig. 8, partly shews a similar plan, to that at fig. 7, the chains or ropes being omitted, in order to show the other parts more clearly. In these figures the same letters indi-

cate similar parts, and the only difference in this arrangement of my invention, is the application of additional pulleys to obtain power, the mode of steering by tort chains or ropes being retained. In this apparatus, the one end of the steering-rope or chain, is affixed at the point, *i*, of the framing of the platform, from thence it passes partly round one of the pulleys, *j*, carried by the sliding frame, *d*, the nature of which is clearly shewn in the drawing; from thence it passes partly around the pulley, *k*; then it takes several turns around the barrel of the axis of the steering-wheel; then it passes partly around the pulley, *l*; then partly around the pulley, *m*, which is carried by the sliding frame, and then its end is made fast to the ring, *n*, affixed in the framing of the platform; by this arrangement, although the speed of the motion is reduced from the steering-wheel to the tiller, yet the power is proportionably increased. On examining the figures now under description, the pin or axis of the pulleys, *j* and *m*, passes through the tiller, and the end of the tiller consists of three plates of iron, each bearing a slot or opening, in which the pin or axis of the pulleys, *j* and *m*, moves and acts, as the socket, fig. 1, in causing the tiller to move when the sliding frame, *d*, is moved, and yet allowing of the varying positions which the tiller assumes, in respect of the sliding frame, *d*.

Fig. 9, shews another arrangement of pulleys for obtaining power. In this case the pulleys, *j* and *m*, are carried by separate axes on the sliding frame, *d*, and the end of the tiller has a slot, which moves over a pin in the centre of the sliding frame, *d*.

Having thus described the nature of my invention, and the manner of performing the same, I would remark, that I lay no claim to any of the parts separately, and some of the details of the arrangement shewn may be varied; but what I claim is the mode of applying steering-ropes or chains, and apparatus above described. — In witness whereof, &c.

Enrolled March 9, 1840.

Specification of the Patent granted to FREDERICK BROWN, of Luton, in the County of Bedford, Iron-monger, for Improvements in Stoves or Fire-places.
—Sealed September 9, 1839.

WITH AN ENGRAVING.

To all to whom these presents shall come, &c. &c.—
Now know ye, that in compliance with the said proviso, I, the said Frederick Brown, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are particularly described and ascertained, in and by the following statement thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked thereon (that is to say) :—

My invention relates to a mode of constructing the fire-places of such description of stoves as are called cooking stoves or ranges, and consists in so arranging the fire-place that the process called roasting may be performed by means of a heated plate in front of the fire-place, thus enclosing the fire, whereby not only is the process of roasting more advantageously performed, but that the heat of the fire economised in the fire-place for performing the processes of baking and boiling. And in order to give the best information in my power, I will proceed to describe the drawing hereunto annexed.

Description of the Drawing.

Fig. 1, is a front view of a cooking stove or range with the fire-place, and parts connected therewith, constructed according to my invention.

Fig. 2, is a transverse section.

Fig. 3, is a plan of the top of the stove or range ; and,

Fig. 4, is a front section. In each of these figures the same letters indicate similar parts.

An iron-plate, *a*, is substituted instead of the ordinary front fire-bars, before which roasting is performed in a very superior manner, owing to the regularity of the heat produced, and entire freedom from dust and ashes. The whole surface on the top presents an extensive hot plate. The fire is thus entirely closed. The boiler forms the back and one side of the fire-place, the other forms the opposite side, which are protected by thick cast-iron plates. The whole heat produced, being thus confined, is applied for all the purposes of cooking, and it will be found that a very small proportion of fuel is requisite, compared with the quantity used in the fire-places of ordinary cooking ranges. Near the top of the roasting-plate (above the body of the fire) a small door is introduced which gives this stove the advantage of an enclosed fire for cooking, and when not required for that purpose, the door may be opened, affording the comfort of an open fire combined with a saving in fuel; for it will be evident that nearly the whole of the draught admitted, passes over the fire which has a tendency to check the effect of the draught of air admitted below; a greater supply of hot-air is also produced, which passes entirely round the oven, consequently less fire is requisite for baking. Below the roasting plate are some gothic openings, *b, b*, in which talc is introduced, to shew by reflection the state of the fire; beneath these openings is the ash-hole, *c*, which is also enclosed; the draught is admitted to the fire through a ventilator, *d*. On the top is a sliding-plate, *e*, where the fire is supplied with fuel. The boiler is fixed upon solid masonry, and requires no other heat than that which it receives from the back and side of the fire. The heated air passes over the oven, it then descends on the opposite side, and passes under the oven into the flue, as is clearly indicated in the drawing; the oven is thus constantly heated in a very superior manner, the heat being more regular than in the ordinary mode of

fixing them. The roasting plate is enclosed by a moveable front, *f*, on the top of which is a small socket, the bottom being left entirely open, a current of air is produced between the two plates, thus a considerable portion of hot-air is generated, which if required may be conducted to any part of the house; if the hot-air is not required for any purpose it may be conducted into the chimney. This will be found very advantageous during the summer season, when the convenience of a fire is required without the inconvenience of the heat produced thereby.

Having thus described the nature of my invention, and the manner of performing the same, I would have it understood that what I claim as the invention secured by the present letters patent is, the mode herein described of constructing the fire-places of cooking stoves or ranges with a front or roasting plate, with other parts for more economically employing fuel, as above described.—
In witness whereof, &c.

Enrolled March 9, 1840.

LAW REPORTS OF PATENT CASES.

*Court of Common Pleas, Westminster,
November 29, 1839.*

Before Lord Chief Justice TINDAL, and a Special Jury.

GALLOWAY *v.* BLEADEN.

(Concluded from page 290.) ●

The Attorney General.—May it please your lordship, gentlemen of the jury, my learned friend in his address to you, has relied on three defences, and with regard to each and every one of those he was equally confident. Now what were the three defences? first, he says there

was no infringement. The second is, that the specification is defective, it does not disclose to the world the information to which the public are entitled, and that a workman of ordinary skill could not make a wheel of the construction claimed from the specification, and therefore the patent is void. Then the third is, that this was publicly known before the date of the patent, and that Mr. Field not only had made experiments, but that he had brought those experiments to a successful conclusion, and that this is Mr. Field's wheel, which was publicly known before the date of Mr. Galloway's patent.

Now, gentlemen, before I proceed to consider each of these defences in its order, let me remind you of the *prima facie* case I had made, that is, my friend does not at all dispute that I have made a case by evidence that entitles me to your verdict, unless an answer has been given to it by evidence. If I had not, of course, he would have called on my lord to nonsuit the plaintiff; but he does no such thing, he makes a very long and jocular speech. I must say it is very delightful in a case of this sort, to have a little interspersion of jests, although perhaps, they are not exactly best placed; and if my learned friend had had solid arguments to rely on, he would have dismissed his jests, and he would have relied on his arguments. But my learned friend in his long and elaborate and droll discourse, I think, did not at all venture to say that we had not made a case entitling us to a verdict, unless an answer were given to it by evidence; and how could he deny that proposition? Gentlemen, we called two witnesses, and more intelligent, more candid, more temperate witnesses I never wish to see in the witness box, I mean Mr. Carpmael and Mr. Cottam, men of great science, of great intelligence, wholly disinterested, who told you that until this patent had been taken out, although they were most familiarly conversant with paddle-wheels, they knew of no paddle-wheel of this construction, that it was new, that it was highly

useful and a very great improvement. And they told you that according to the specification which Mr. Galloway enrolled, that any ordinary workman would find no difficulty whatsoever in constructing such a wheel.

Then, gentlemen, my learned friend says, "well, but you have not called witnesses to shew how it was generally introduced, and how successful it has been? Gentlemen, I must say on the part of the company who instruct my learned friend to make use of such an argument that it is most uncandid and most disingenuous, for upon the record, as my lord has already intimated, the usefulness of this invention is admitted. They do not, on our declaration, alleging that it was useful and a great improvement on paddle-wheels, they do not venture to deny, they do not say by their plea, that it is not useful. If they had what would have been the consequence? Why, gentlemen, we would have called witness after witness, and have occupied twenty-four hours, in shewing the utility of it, in shewing—the expression I repeat—the brilliant success which this discovery enjoyed. But they admit the utility of it; thus leading us to believe that that would be no question whatsoever in this cause, and now they would taunt us for not having called evidence which would have been irrelevant and impertinent to prove that which they themselves on the record have solemnly admitted.

Well, gentlemen, we having made out such a case upon such evidence, how was it met by my learned friend? You see I am not bound to prove the utility of it, that is admitted, and it cannot admit of any doubt. Gentlemen, they are obliged to admit it and it gives me the most sincere pleasure to find that several of you gentlemen are very familiar with the subject, and know a great deal more of it than the counsel on either side. But I will venture to say that every one of the twelve gentlemen, I have the honour to address, without one single exception, see at once the great utility and improvement of this

invention. It is allowed on all hands, aye, by Mr. Berry, who was extremely desirous, voluntarily to shew the model which he himself in his zeal had made. Mr. Berry allows that it is a great improvement, and that it takes off from the shock of the vessel; and if it takes off from the shock of the vessel, it must necessarily accelerate her speed both in the rivers and on the ocean.

We are now, gentlemen, upon the question whether there has been an infringement. Let us see whether there has been an infringement or not, and when I am considering whether there has been an infringement, I am entitled to suppose that in other respects the patent is free from all objection. There is a conclusive admission that it is useful, that it is a very great improvement, the manner in which it has been introduced into the Great Western, the British Queen, the African, and the various companies which have approved and adopted it, these are abundant proofs of its utility. But, gentlemen, I admit, that, however useful it may be, however successful it may have been, that unless we prove that it has been infringed on the part of this company, on that issue your verdict will be against me. Now, gentlemen, at an early stage of this cause you were desirous to do what is exceeding important, and which cannot be done too speedily; you were desirous of making a comparison between the two models. I entreat you, if you have the smallest doubt on this subject, either in the box, or when you leave the box to consider your verdict, to take these models with you, compare the models together, see if there can be the smallest doubt in the minds of any one of you that the Chieftain and Grand Turk are a complete slavish imitation of the wheel, which is made under this specification. Nay, gentlemen, I do say most unfeignedly, that I am utterly surprised and astonished that my learned friend, Mr. Hill, should make such an objection, and should rely upon such a defence, because only observe the reasoning to which he himself resorts; he says, 'are not the Chieftain

and the Grand Turk, the same as the wheel constructed by Mr. Field, then he says, Mr. Field's is the same as ours; therefore, gentlemen, things which are like a third will be like each other; why that is demonstration you see, because according to his own shewing, he says, that the Grand Turk and Chieftain are the same as Mr. Field's, then he says, if they are the same as Mr. Field's they are the same as ours; so much for the infringement. You see my friend's own case makes out the infringement, because he says these are the same as Mr. Field's, and he says Mr. Field's is the same as ours; therefore these would be an infringement of Mr. Field's, if he had taken out a patent, and if they would have been an infringement of Mr. Field's if he had taken out a patent, they would have been an infringement of Mr. Field's, they are equally an infringement of Mr. Galloway's.

Now I have disposed, in a very few sentences, of the first defence relied on by my learned friend, we now come to one of which he was equally confident with the other two. Now, gentlemen, we come to the second, and that is, that the specification is not sufficient, upon which subject I think that he has not examined any witnesses except himself. The whole of my friend's case on this point was a question put to Mr. Field, when my learned friend, Mr. Alexander, had sat down, and he thought by way of suggestion that it might be worth while just to ask him respecting the specification. Now what does that witness say, bearing in mind that we have proved by Mr. Carpmael and Mr. Cottam, that any workman of ordinary skill by reading the specification might have made the wheel; well how was that evidence to be met? It ought to have been met by calling a number of workmen of competent skill, who might have said that they had tried to make the wheel, but they had tried in vain, that it did not contain sufficient information for discovering the curve either on one side or the other; but no such evidence is given. It is most strange they

don't venture to put a question to Mr. Berry, or to any one of the witnesses, scientific or non-scientific, who would not have been at all reluctant to give an answer in favour of the defendants, but they confine themselves to putting that question singly to Mr. Field, who is the defendant in the cause. Well then, gentlemen, what becomes of this objection, which my learned friend makes to the specification, for which there was no foundation in probability, none in reason which is removed by my evidence, and which his own evidence corroborates that which I laid before you.

Therefore, gentlemen, we come to the single question upon which my learned friend can at all pretend to ask for your verdict, on any of the issues he laid before you, and that is this, Was this wheel published to the world before the patent was taken out by Mr. Galloway, a good test being, had Mr. Field himself done anything which would have prevented him from afterwards taking out a patent, and that patent being a valid patent? If Mr. Field had not disentitled himself by publishing this to the world, to take out a patent himself; then, gentlemen, the patent of Mr. Galloway cannot possibly be assailed. There is no pretence here for saying that Mr. Galloway took his wheel from Mr. Field; if they were concurrent discoverers, which I think they were not, but if they were not it is not pretended to be said that Mr. Galloway took his discovery from Mr. Field. Who is Mr. Galloway?—Allowed on all hands to be one of the most ingenious men in mechanical science that has ever appeared in this country, allowed to be the inventor of Morgan's wheel, the merits of which it is impossible to over estimate,—the ingenuity of which it is impossible to over estimate, and the only objection to which is that it is rather complex, that it is expensive, that it may be deranged, and it may not easily be repaired. To be sure, it is the opinion of Mr. Barlow, that most singular philosopher examined here to-day,

that it may be said that Morgan's wheel is no improvement; he says there is no disadvantage at all in the common float entering the water obliquely, and in giving a great shock, and he says, that the greatest propelling power is at the very moment when the float-board first touches the water. Why, gentlemen, it is very true that if that philosophy was sound, it might be said that Mr. Galloway's wheel, called Morgan's wheel, was not an improvement because the object of that is to prevent it entering so obliquely, and to make it enter like the oar in rowing. But, gentlemen, Mr. Barlow stands quite alone, he is the founder of a new school on this subject, and he will get no one else to agree with him. Well, is it very unlikely that Mr. Galloway, who had made one great discovery, but which was subject to these objections, that it was expensive and easily deranged, and it appears that he had been devoting himself to find out some other improvement not liable to these objections; is it at all unlikely that he should make this discovery? Why, gentlemen, it is not only not unlikely, but I have proved it to be the fact, for by two witnesses I have shewn it to you, one was Mr. Gibbs, who swears positively that in November before Mr. Galloway's patent was granted, that Mr. Galloway communicated to him the whole principle of this new wheel, exactly such as it now appears on the specification;—now when was the November before the patent was granted? Why, gentlemen, that was November, 1834, and then you have it in evidence, and that is confirmed by the testimony of Mr. Carpmael, who says that Mr. Galloway applied to him at the end of 1834, or 1835, but Mr. Gibbs swears positively it was in November, 1834, that Mr. Galloway applied to him, and explained to him this new wheel he had discovered exactly on the principle upon which it now rests; well then, you must therefore take it as a fact in the cause, that Mr. Galloway, pursuing his researches and continuing his experiments, has found out

this new contrivance to obviate the difficulties that had been before experienced, and that he had brought this to perfection in November, 1834.

Well then, Mr. Galloway being the discoverer of this wheel, and having brought it to perfection in November 1834, he takes out a patent for it in August 1835, and he specifies it in February 1836. Now, gentlemen, the question is this. Is there any evidence before you to shew that anterior to August 1835, the wheel had been published to the world? Gentlemen, it is quite unnecessary for me to enter into any minute discussion, respecting the principle which is to be found in the model which Mr. Field constructed, and the wheel specified by Mr. Galloway. I think if it were material it would not be difficult to point out some important difference in principle. You might suppose that there was an important difference when Mr. Field began by thinking that he had made a great discovery by a scoop by which, instead of the tail water being diminished, it was to be greatly increased, and there was to be a scoop by which it was to be lifted from the sea; and another reason why I think you might expect that Mr. Field might not arrive exactly at the same perfection with Mr. Galloway is this, that he after a great deal of cross-examination on my part, came to this conclusion, and gave me at last this definite answer, that, in his opinion, it was quite immaterial at what distance the floats were from each other. You remember, gentlemen, I had great difficulty with him, but at last he gave me a distinct and definite answer to that question; and he said that in his judgment it was wholly immaterial at what distance the floats were from each other, in which he is not corroborated by any other witness who is called on the part of the defendant, and particularly by Mr. Berry, because he tells you that the propelling power must be much greater if the different pieces of the paddle-wheel come so close to each other as to prevent the water running between the interstices, so that they

might act like one single continuous float. But Mr. Field said that was what never entered his imagination; all he thought of was to make the different pieces of the float-board enter the water at the same point, he being utterly regardless of the distance at which they were from each other. And thence, gentlemen, arises the failure of Mr. Field, because you will observe, gentlemen, the model I laid before you of the Endeavour's wheel; and that model shows the different pieces of the float to be at such a distance as that they could not act in concert, they come into the perpendicular at different times; they would rather oppose instead of assisting each other, and that amongst other reasons, accounts for the failure of the experiments with the Endeavour.

But, gentlemen, again I say, it is not at all necessary that I should enter into any minute discussion as to whether the principle be the same or different, I think, if you will just look at the model, you yourselves, with the glance of an eye, will see that it is materially different where the parts overlap each other, and that it is not on the same principle, and I believe that you will find that all these would be beyond the limits described in the specification of Mr. Galloway. But then the Endeavour, it is said, is on the same model and according to the same principle with the other wheels that were constructed for a long time by Mr. Field. Well, therefore, if that was the case, they would all be on a contrary principle, not one of them would be within the limits Mr. Galloway has specified. Now, gentlemen, again I say that it is not essential to my case to enter into any minute analysis of that principle; for I have shewn, to your entire satisfaction, that if they were identically the same, which I deny,—if they were identically the same, there has been no publication that would have prevented Mr. Field himself taking out a patent, if Mr. Galloway had not interposed, or which would prevent Mr. Galloway taking out a patent, there being no opposition on the part of Mr. Field.

Now, gentlemen, I say, with some confidence, because on that subject I have the authority of my lord, that while the shewing of the discovery rests merely in experiment, that that is no publication which will prevent the person who makes these experiments from afterwards taking out a patent himself, and will not prevent a contemporaneous discoverer from taking out a patent upon the ground that there has been a publication to the world. And, gentlemen, I say that the doctrine which is now contended for would be fatal to genius, because it would prevent genius from reaping the reward to which genius is so well entitled,—it would render it necessary that every man making his experiments should retire into a cave, and that he should have some iron gate by which all the world should be excluded, and that no human eye should see his discovery until he had enrolled his specification.

Gentlemen, I take it, speaking always with the most sincere respect as to the direction in point of law you may receive from Lord Chief Justice Tindal, I take it, that while experiments are going on, there is no publication to the world that would prevent a patent being taken out; and you have exactly the question to put to yourselves, if Mr. Galloway had not interposed in the year 1836, and Mr. Field had brought his wheel to perfection, and had happily taken out a patent for it; could that patent have been rendered null and void by shewing what was done in the year 1833 by the communication of it to the admiralty by the experiments made in the ship *Endeavour*, by the model that was constructed, or by the experiments that were renewed in the year 1835? Now, gentlemen, I take it that the law on this subject has been well settled, since *Dolland's case* has been acted on again and again, and it was carried still further in the case of *Jones v. Pierce*, respecting the suspension-wheels, where, before the date of the patent, there had been wheels on a similar construction made at Belper near Dudley, which had run

upon the streets, but which were used substantially only as an experiment, and which had been abandoned before this patent for the suspension-wheels was taken out,—they had run two years. But, gentlemen, I will content myself with reading a very short passage of the doctrine on this subject as it is laid down in the case of *Corliss v. Keene*, which I had the honor to argue before his lordship in this honorable court. That was a case, as his lordship will recollect, respecting the manufacture of threads from India-rubber, where there were filaments of cotton or wool that were superinduced upon pieces of caoutchouc or India-rubber, and there was there a body of evidence by which I was somewhat appalled at first; shewing the various experiments that had been made, and the various attempts that had been repeated for the purpose of making a similar manufacture; but the jury had these questions propounded to them: Was it brought to perfection? Did it rest only in experiment, or was it published to the world? Or was it adopted by the world as a perfected discovery? The jury on that occasion, found a verdict supporting the patent; and there the verdict was established by the unanimous judgment of the Court of Common Pleas. On that occasion Lord Chief Justice Tindal says, “the first who comes and takes a patent, it not being generally known to the public before that time, that individual has a right to clothe himself with the protection of letters patent, and that it being afterwards proved that experiments had been made in various quarters upon the same subject previously, would be no answer to an infringement of such patent.” Well does this evidence not class itself under the description of experiment? Why, gentlemen, can there be any question about it? My learned friend, Mr. Hill, was a little at a loss to account for this circumstance; if Mr. Field had consummated his discovery and brought his experiments to a successful termination, why did he not take out a patent for it? Now, gentlemen, it is allowed by Mr.

Field himself, that this is a most valuable discovery, and that the patent for it would now be of great value to the patentee; that evidence I had from Mr. Field's own mouth. Why did not Mr. Field take out a patent for it? Oh! as I understood my learned friend to say, or as you understood him to say, Mr. Field was above thinking of the paltry profits of monopoly. Instead of taking out patents, he is much better employed in pursuing his discoveries and serving his customers; and if he had made a discovery, such as was made by Watt, in the steam-engine, whereby a fortune might be secured to him; why he would have disdained to ask for a patent from the crown. But how does that turn out gentlemen. Why Mr. Field has a very sharp appetite for patents. He has taken out no less than three in his time, some before Mr. Galloway's patent, and one since Mr. Galloway's patent. Well, then, I ask you, as sensible men, if Mr. Field had brought this discovery to perfection, and had thought that it was valuable, what would he have done? Why, gentlemen, he would have taken out his patent for it. But he says that he did think of taking out a patent for it; and more than that, gentlemen, he entered a caveat, so that no other person might take out a patent for the same object. Well, gentleman, according to the well known practice, if he had entered a caveat, he would have had notice that Mr. Galloway's patent was under solicitation, and that Mr. Galloway claimed it. But how was that? Mr. Carpmael tells you there was no opposition. My learned friend has alluded to what is well known to be the practice, that it is the duty of the Attorney or Solicitor-General to hear all parties; the decision of the law-officer of the crown is by no means conclusive, but it is his duty to refuse a patent, if it be shewn by any person that there has been a patent before granted for the same object, or that it is known to any other individual. I may say, I suppose, without harm, that I myself have repeatedly, since I had the honor of

serving the crown as Attorney-General, refused patents where it was proved before me, that the reputed discovery was known before. No longer ago than within the last forty-eight hours, I have exercised my judgment in that way ; and if Mr. Galloway had solicited this patent, and Mr. Field had thought fit to come and shew before the Attorney-General, that he knew this discovery before hand, and that he was the discoverer just as much as Mr. Galloway was ; there can be no doubt that the patent would have been refused. But instead of that, after the caveat had been entered by Mr. Field, Mr. Field allows Mr. Galloway to get his patent.

Now, gentlemen, do you believe that that was so ? It is quite clear that at that time Mr. Field thought his patent was of no value. He gave it up, because he thought it was of no value, and he tells you now that in smooth water it will do very little for accelerating a vessel. Now he differs from every other witness who has been examined on the other side in this cause. Mr. Field wishes to depreciate the value of the discovery. This was to reconcile what was done with respect to the Dover Castle ; he says, the only use of it is when there is a great sea. Why now all the other witnesses who have been examined on both sides, tell you that it is a great improvement in smooth water as well as in rough water. But it is quite clear that Mr. Field had been of a different opinion, he thought it was of no value, he renounced it, he abandoned it, he had no objection to Mr. Galloway's taking out a patent for it ; and it was not until Mr. Galloway had taken out a patent, and had made it public, and that Mr. Galloway was likely to derive both fortune and fame, it was then, and then only, that Mr. Field thought fit to interpose.

Now, gentlemen, let us see what publication was there to the Lords of the Admiralty ? It would have been exceedingly material to have seen the letter which was written by Mr. Field to the Lords of the Admiralty.

Then why is it not produced? If this letter would have served the purpose of Mr. Field, it would have been forthcoming. Why, what are you to conjecture from that letter not forthcoming? That it would be prejudicial to Mr. Field's claim, and that what he there described was essentially different from that which Mr. Galloway has patented. Well then, he says, in the month of May 1833, he went to the Lords of the Admiralty, and they said they wished an experiment to be made by Mr. Field himself. Now, gentlemen, if the test be, Does it rest in experiment? have you not the very language used by Mr. Field himself, because he says I went to the Lords of the Admiralty, and I wished an experiment to be made, and they told me that the first ship that came in to be repaired should be submitted to me, and upon that ship I should make the experiment; well, but the Lords of the Admiralty never did so, the experiment never was made upon any ship belonging to the government; and nothing was done respecting the government steamers that could in the slightest degree be considered a publication to the world. In May 1833, he applies, he has a promise, nothing done in 1833, 1834, and 1835. But was there not plenty of other ships he might have fitted up with this wheel? If he had any confidence in this wheel, why did he not say to some of his customers. "I have made this discovery, I can now give you a wheel much better than Morgan's—much more simple, much more solid, much more economical; do let me fit you up a vessel?" Why he had twelve ships to fit up in one year, and upon not one of them did he venture to make the experiment or propose this wheel to any one of his customers; so he goes on during the year 1833. But then he says that he put one wheel upon the Endeavour, and that was, I think, in May or June 1833. Was not that experiment? Aye, gentlemen, was not that an experiment which was supposed to have failed, although Mr. Field will not acknowledge that he made use of the expression, that it was

an entire failure? Does not his case shew that that is the conclusion to which he came. But looking at the account given of this experiment by the Engineer, by the Captain, by Mr. Berry; what was it but an experiment? They take off only one wheel for the purpose of a trial, and we are told it ran about a month or six weeks. It required more steam, shewing that it was a very active conductor, and that there was a great loss of power; that was one reason why it was given up. * What was done at the end of six weeks? Do they put on another wheel according to the newly invented cycloidal wheel? No; on the contrary, they take off that which was supposed to be the cycloidal wheel, and they put on the old radial wheel; and so the Endeavour ran from that day to the present hour with her old fashioned wheels? Is not this an experiment? Why it was. If Mr. Field had found that that experiment had succeeded, he would have put on a pair of wheels on the Endeavour. But instead of doing that, he does nothing from the summer of 1833 to the spring of 1835. Now, gentlemen, you will be good enough to bear in mind before the spring of 1835, Mr. Galloway had prosecuted and completed his invention, for it is in evidence before you, that in November 1834 he had completed his wheel. Well, then, what takes place in the year 1835 on the part of Mr. Field. Why, gentlemen, he says that he renewed the experiment, he had no confidence at all in the operation of this wheel, but he made experiments on this wheel along with others; he had a piece of water with a little island in the middle of it, and he made experiments with this wheel among others; and there was a table which shews the result of those experiments. These experiments were after Mr. Galloway had brought his wheel to perfection, and even now they are only experiments; and these experiments were abandoned in July 1835.

Now I have shewn you—I have exhibited to your faithful eyes, a model of what was the wheel of the Endeavour.

I have shewn that that must necessarily fail. The wheels of the Dovor Castle, which Mr. Field fitted up in 1836, were constructed on the same principle; they likewise failed. So that as late as 1836, Mr. Field himself does not know the principle on which these wheels are to be constructed, so as to gain the object that was in view. Then, gentlemen, you will consider, that now the wheels of Mr. Galloway are coming into play, they are adopted by the defendants in this action, one after another, and there was ample time for them to judge how the wheels had answered, and whether they would produce the desired effect. A year after that, they had to pay us 40*l.* for a licence, to construct wheels according to our specification. I think that was pretty good evidence, that the specification was sufficient, because it was 40*l.* to use that specification, and to put the patent in force, without their being subject to an action. Well then, under those circumstances, you see that even in the year 1836, Mr. Field has not acquired sufficient skill, whereby he can construct wheels, which will gain the object in view. But then, gentlemen, as Mr. Galloway's wheels come into use, his skill improves.

Well now, gentlemen, you see the Dovor Castle still fails, and it is not until the year 1837, that Mr. Field fits up the African; aye, but now he is in full possession of the secret, because in the year 1838, he fits up the Great Western, allowed to be on the same principle. Will it be said, that the Great Western has derived no benefit from this wheel? Is it not matter of notoriety, and can it be at all disputed, that the wonderful achievements of that vessel, are very much to be ascribed to the construction of her wheels, whereby it would appear, that she can even go at a velocity that could hardly have been anticipated? Well, now this is not a failure, the Endeavour was a failure, the Dovor Castle was a failure, how the African succeeded, we know not, but the Great Western, which in

the year 1838, is fitted up by Mr. Field, that is the most successful exploit.

Now, gentlemen, has Mr. Field any reason to complain? he, gentlemen, set no store by the discovery; he says that he knew it in 1833, he renounced it, he allows Mr. Galloway to take out the patent, Mr. Galloway takes it out, Mr. Galloway has the success I have mentioned to you; Mr. Galloway sells his wheels to the Commercial company, and other companies that employ him, and it is not until the year 1837, or two years afterwards, that Mr. Field, in respect of his abortive experiments, comes to try to set aside the patent of Mr. Galloway. Gentlemen, I say this is not handsome treatment of Mr. Galloway, by Mr. Field. If Mr. Field wished to avail himself of his supposed discovery, he ought to have taken out a patent himself. He would have taken out a patent for himself, as he did for his boiler, and other things, which he thought entitled him, as an inventor, to a patent. He ought to have opposed the patent of Mr. Galloway, but he is not to lie by, and when Mr. Galloway's patent has succeeded, then to rake up these abortive and forgotten experiments, and in respect of them, to say that Mr. Galloway's patent is to be voided. Mr. Field will have no reason to complain, when you have given your verdict in favour of Mr. Galloway, because he himself has pronounced an opinion upon his own discovery, he takes no measures upon it for years and years, as they roll on, but he allows Mr. Galloway, as an ingenious man, who had discovered the wheel, he allows him to take out the patent, and then, when Mr. Galloway has succeeded, and thinks he is about to receive a remuneration for all his labours, then he says, I had discovered this wheel before, and I will shew that this patent is wholly invalid. That would be very unhandsome, and very iniquitable, now, and I am glad to think, that it is what the law of England will by no means sanction.

I think I have now disposed of all the defences set up by my learned friends. There was the infringement; the defect in the specification; there was the publication to the world before the patent of Mr. Galloway; upon all these my learned friend relies, and I think upon none of them will your verdict be pronounced against my client, Mr. Galloway. I think you will see that this was a most useful invention: that is not disputed; you will find that it has been infringed, you will find that the specification was sufficient, you be will of opinion that all Mr. Field has done rested merely in the way of experiment, and that he himself had done nothing to bring those experiments to a successful issue, that Mr. Galloway before those experiments had been brought to a successful issue had taken out a patent; he is the grantee of the crown, and I hope, gentlemen, by your verdict he will have his right established and that he may long enjoy it.

The Lord Chief Justice.—Gentlemen, this is an action brought by the plaintiff, Mr. Galloway, against Mr. Bleaden, the secretary to the Commercial Steam Packet Company, to recover nominal damages, but to recover a verdict, on the ground that the defendants, the Commercial Steam Packet Company, have infringed a certain patent which he had taken out, namely a patent that was granted to him on the 18th of August, 1835, for certain improvements in paddle-wheels for propelling vessels. In answer to this action the defendants set up three grounds of excuse: first, they say they are not guilty, that is in other words, that the paddle-wheels they have employed in the Chieftain, and the other ship called the Grand Turk, are not an infringement of the patent; then a second ground of answer that they set up is this, that the nature of the invention, and the manner of its performance have not been truly described in the specification. Now that is a good answer in point of law; it is a condition on which the party to whom the patent is granted obtained it, and it being a condition it must be

performed strictly, that is, he must communicate by his specification to the world, a sufficient mode of making this improvement, of which he has the exclusive privilege for the fourteen years, in order that when the patent has expired, the public may have the full benefit of it on reference to that specification; then the third ground, the remaining ground, of the defence is that the supposed invention was not a new invention, but was used in England before the grant of the patent; that again is a sufficient answer to the validity of the patent. If the crown was deceived, intending only to grant a patent to the original inventor of a commodity or thing that was not generally known or used in England before, that in point of fact instead of being, as the crown thought it, a new invention unknown to public before, it was not a new invention but used in England. Therefore you will have to say on the evidence you have heard on these three different points, whether you find your verdict on all or any of them for the plaintiff or defendant.

Now, with respect to the first, that the wheel is not an infringement,—that the paddle-wheel used by the defendants is no infringement of the patent granted to Mr. Galloway, the evidence lies in a very narrow compass. There have been two witnesses called on the part of the plaintiff, namely Mr. Carpmael and Mr. Cottam; and they were asked, looking at the wheel of the Grand Turk, and the other vessel, the Chieftain; they have been asked, having read the specification and seen the model which was produced before them, whether these two wheels are not an infringement, a copy made after and agreeing with the principle laid down in the patent; and they unequivocally say they think it is. We have had no witnesses called on the other side to whom that question has been been distinctly put, who have been asked whether they believe it to be an infringement or not, but every witness was asked this question, whether it agreed with a certain wheel that had been supposed to be invented or discovered

by Mr. Field, in 1833, and put on board the Endeavour. That was the way in which every question was put ; not a distinct question so as to bring forth a distinct answer on the subject of the infringement, but putting it in that collateral way, meaning upon the ground as the defendants contend the plaintiff's invention is borrowed from the one which was known before, that therefore, virtually they wish to shew the two inventions were in fact the same, but it certainly seems to me that as they did not put the question distinctly and directly, whether in the opinion and judgment of the defendant's witnesses, such infringement had taken place or not, that they rather fortified the plaintiff's case than weakened it by drawing out from their witnesses, that it was made on the same principle as the wheel that was put on board the Endeavour, the main part of their case being, as they pretend, that this was a discovery which the plaintiff himself has since adopted and got a patent for, because if it is made on that principle, and is in effect an infringement of the wheel of the Endeavour it seems to follow by no very weak inference or conclusion that it is virtually also an infringement of the patent ; however on that, judge for yourselves.

The next answer that is put on in the record is, that the plaintiff, when he enrolled the specification of this his patent, did not so describe the matter in the specification as by law he was required, that he had not in the language the plea uses, " truly described his invention ;" and if there is a want of clearness so that the public cannot afterwards avail themselves of it, much more if there is any studied ambiguity in it, so as to conceal from the public that which the patentee for a term is enjoying the exclusive benefit of, no doubt the patent itself would be completely void. This is also a question to be determined on the evidence brought before you. If it had appeared on the face of this specification that it was so manifestly ambiguous in the terms that it used, or on reading it, no person of ordinary sense and judgment

could make of it that which the party professed to disclose and which he was bound to disclose, that the specification was not a compliance with the patent, then no doubt it would have been void ; but it does not appear to me at all, upon looking at it, that there is such doubt and difficulty on the construction of the specification itself. There has been a great deal of stress laid on what we heard so often, the coincidence of the rolling cylinder which is to represent the rate of going of the vessel, and the wheel which forms the circle or boundary of the lower part of the floats, and a great many observations have been made, that certain acts that may occur are not provided for in the specification, for in this specification it does not, I confess, appear to me on the face of the patent that such is the necessary conclusion, because you are to take the patent, not by itself, but with reference to the figures ; and when you look at that figure which is called fig. 1, and compare it with the statement made in the specification, I confess I am unable to say on merely perusing it, which is all I am bound to say, that there is that degree of difficulty, or in fact that I feel any great difficulty on the subject. But the main question on this point is for you, gentlemen, and that is whether it is such a fair and clear statement, that a person, with a competent degree of knowledge upon the subject matter to which the patent relates, would be able to make that which the patentee, the plaintiff, now enjoys the exclusive privilege of. He has called one or two persons,—both the two first witnesses, and, I think, the third also, certainly the two first,—who state that in their judgment, a perusal of this by a workman, who was employed in manufactures of this nature and description, would qualify him to make a wheel of the nature of those, and in the same manner with the same properties as those which the plaintiff at present enjoys under the patent. I do not find that even that is broken in upon by the other side, for there is no witness called to whom that question is put, except Mr. Field, and Mr. Field's answer to one

part of it, where the question is put to him is this, he says, "I have read the specification, and looking at the specification, (which was the main point that was put to him about the rolling circle); I think the rolling circle and the inner circle of the floats, are intended to be the same circle." He says it is not expressed in the specification, whether *d*, belonged to the rolling circle or to the circle of the edges of the floats. If it belonged to the rolling circle, all he says is this, I do not think a workman would know whether the point, little *d*, was the point belonging to the inner circle, or the rolling circle, that is his judgment. If you have had an opportunity of looking at the figures as connected with the specification, I confess in my mind it does not appear a subject matter of doubt that that little *d*, is the point that is formed by the surface of the common radial float with that inner circle, and this only gives you the point upon which to set off, on such occasion, to form your cycloid for the new form of floats, provided that may or may not be the case.

Now, gentlemen, the third and last is the main point in this case, whether this was an invention new at the time, or whether, in the language of the issue that is raised for your consideration, this improvement was new as to the public use and exercise thereof in England.

Now the date that I have to call your attention to is the date of the patent, namely, the 18th of August, 1835; what you have to ask yourselves is whether on the evidence, that which Mr. Galloway has described in his specification was new at that time, or whether it was known and practised before in the realm of England.—Undoubtedly if it was, there is an end of the patent; upon that point the law is undoubtedly now understood to be this,—a mere experiment, or a mere course of experiments, for the purpose of producing a result, which is not brought to its completion, but begins and ends in uncertain experiments,—that it is not such an invention as should prevent another person, who is more successful, or pursues with greater industry the chain in the line, that has been laid out for

him by the preceding inventor from availing himself of it, and having the benefit of it; therefore the main point in this case, is, whether all that is allowed to have been done by Mr. Field rested in experiments, and unsuccessful experiment not conducted to its full result, or whether it was a complete discovery of that which now forms the subject matter of the patent.

Now, gentlemen, on that, the evidence of Mr. Carpmael and Mr. Cottam is, as you will suppose, only general, because they are called to negative, that this was known before. Therefore, all they can say, is, that they are people who are conversant with subjects of this description, and pass their time, and part of their lives in understanding the nature of patents, and in following up, and discovering, what are the inventions, that are going on from week to week, and all they say, is, that they had not before heard that there had been such a discovery, previously to the issuing of the patent, in August, 1835. Therefore, that is enough to call on the other side, to shew affirmatively, that it was not new, that it was an old matter, and used, and exercised before, within the realm of England, and you must say, whether the evidence which they have brought before you, in the way in which it seems to me it ought to be understood, has brought your minds to that conclusion, or not. That is a mere question of fact, which you must decide for yourselves.

Now, upon that, Mr. Field is first called, and gives an account of all that he had done, in the way of invention, and carrying that invention to the purposes of practice, and the account he gives, is this; he says, "In the year 1833, I made an improved wheel, a model of which I took to the admiralty." Then he gives you the original model, that he made at that time, he says, "This is the one I made it from, and I conceived the idea of dividing the board into a curve, which curve I obtained, by holding my pencil at the edge of the supposed water line; I then placed the same quantity of surface of paddle in four bars, that is, a cycloidal curve." Then he says, "This model

shews it better, that is the new model that I made; at that period we were employed by the Admiralty, and had just completed six large steam-engines. I wrote to the Admiralty." Then he says, in consequence of that, he afterwards went and attended there. He says, "The model was produced and explained by myself and partner, to the Admiralty; they were much pleased, and they determined to adopt it; they said the next vessel that arrived, should have the improvement." A vessel did arrive; however, he had not at that time the vessel, because it did not happen to be of their own make, but some other person's. And then he says, "The model remained about a week in the Admiralty, we kept it in the drawing office of our manufactory, we showed it to any one that came, who wished to see it, and to any persons concerned in steam-vessels." Then he goes on to say, "I made an experiment myself, in a small vessel of our own." The question you are to determine, is, whether in the evidence, the thing itself was complete, so as to be used, or whether, only a series of experiments were going on? Up to this time the model had been shewn, but, not any actual paddle-wheel made, much less up to the time we are now discussing, had any one been applied to any real practical use. Now comes in, what he calls himself, an experiment. "In a small vessel of our own, the Endeavour, which is a steamer from London to Richmond; we put a paddle upon it, this paddle is suited for the sea, and not for fresh water; we put one fresh paddle on the wheel of the Endeavour, the result was, the agitation of the water was quite removed, or scarcely perceptible, we continued the experiment, (as he called it) for some weeks; we then restored the former wheel." It is afterwards explained, that the reason why this wheel was taken away, and the old one restored, according to the Captain's account, was because the boiler was not large enough, to make steam sufficiently fast for this, which had a quicker rotary motion. Then he goes on to say, that in 1835, a great

many experiments were made. "I got this original knowledge in the year 1833." And when we are discussing whether he had brought that to any degree of perfection at that time, so as to be a matter that was known, and capable of being applied to vessels at all; it is odd and singular enough, (but that will be for your consideration) that he should go on in 1835, making a great many more experiments. He says, "In 1835, we made a great many experiments, of which the general character, was to ascertain the various qualities of wheels, chiefly cycloidal wheels, and comparing these wheels with Morgan's wheel. I had a very extensive apparatus constructed, for the purpose of these experiments; it stood in a very public part of the premises, no person was excluded, a great many saw it, it was in the thoroughfare of the manufactory. We had between 400 and 500 employed at that time, in our manufactory." He says how the apparatus was constructed, (which I think was not very material,) but that apparatus they constructed, merely for the purpose of deciding upon these experiments. Then he says, "These experiments were made between the 16th of April and the 12th of June 1835. We had a person solely employed in these experiments, no secrecy whatever was observed, on the contrary, we invited people to come and see them. I first heard of the patent taken out by Mr. Galloway, on the 8th of September, 1835. I remember a model put up by him in the Adelaide Gallery." It appears, therefore, from the month of September 1835, Mr. Field was fully conscious, that there had been this patent granted to Mr. Galloway, and we do not hear of any opposition to it, for a very considerable period afterwards. Indeed on the part of these defendants, a year afterwards, so little are they informed, or so little do they know, that there had been a doubt as to the validity, that they pay for the use of these floats, for a vessel of theirs, called the Calpe, 40*l.*, having previously, in the years 1835 and 1836, just after the granting of the patent, had the same patent improve-

ment applied, at a much larger sum, to other vessels. Then he says, "I have carefully examined the specification of Mr. Galloway, I have seen the models produced, the principle laid down in that specification is precisely the same as mine; I had the same object in view, that of arranging the floats in a cycloidal curve; I have not been able to find in Mr. Galloway's specification, any thing whatever, different to what I had in view, except what I had before; the advantages mentioned in his specification, are the very same advantages, that I contemplated and proposed." Gentlemen, then he is cross-examined, as to this point, and he says, "I have taken out patents myself, altogether three, one of them a little time ago, the idea crossed my mind for taking out a patent for this discovery. I entered a caveat for my discovery, in 1833. I never did anything upon it, it is now a very valuable wheel, it is now in general use, a valid patent for such a wheel, would be very valuable to the patentees, it would be valuable to me; I never did it. I continued making experiments till July 1835." Certainly it is not an improper observation, one that you should bring before your own minds on this question, that is, whether it was the invention of Mr. Field, before Mr. Galloway, and an invention carried so far to perfection, that the matter might be known and used in England? It is not an improper observation, that, as he had entered a caveat at the office of the law officers of the crown, he must have had notice of this, the patent would not have passed, without some notice given to him, that such patent was taking out, and yet you see, though he had put in his caveat in the year 1835, and made experiments from April to June, and goes on making experiments every preceding month to 1835, he does not at all interpose, or set up his claim, at that time, to take out a patent. I do not mean to say he was bound to do it, or, that his not doing it, will decide this question at all, but, when we are considering the course that men ordinarily pursue in looking after their own interest, the question is, whether he is perfectly to be depended on, as to the

exact identity of this discovery, that this, which is now the subject of a patent, was the very discovery, which he himself had made? That is for you, and not for me, to determine. Then he goes on to say, "I continued making experiments till July, 1835. I never fitted up a vessel for a customer, till the Dovor Castle, that was the name of it, the wheels were afterwards altered, from three boards to two, and so they continued. That vessel did not go faster nor slower than before, but the vessel was better for the sea; she was always a slow vessel. The next vessel we fitted up with split boards, was the African, that was in the summer of 1836." That is after the period when this patent was granted, therefore, any thing that is done after that, if it is a wheel of the nature and description of that for which the patent is granted, that is not to be brought in evidence against the plaintiff, as a prior discovery, except, so far as that the party who gives the evidence, says that it was upon his own principle, and not upon the principle of the patent. The mere fact of applying it so late as the year 1836, the year after the patent was granted, would not of itself, of course, shew that the subject matter had been known, and used in England, a year before. Then he says, "I am not quite positive, that I fitted up any but the Dovor Castle, with wheels on this construction. I fitted up the Great Western, with wheels of this construction, in the year 1838, the wheel is now in great repute, I had no knowledge of the floats being divided in this way, before I did so myself. I did nothing for the Admiralty, before August 1835." Then in fact, he says "I did not do it till the summer of 1836, I did take off the new wheel, after having satisfied myself with the experiment, and I put on the old boards again." He says "We did nothing in 1833, 1834, and 1835; in 1835 we commenced our experiments, and we still continued to make comparative experiments." Then he goes on to say something more as to the specification, which is not material. [His lordship, after reading the evidence of the other witnesses, proceeded as follows:]—

Now the next point, as it seems to me, for your consideration, is, whether you are satisfied or not, that at the time when this patent was taken out, the invention for which the patent was obtained, was a new invention, and not used publicly in England, which are the words of the plea? That there had been many experiments made upon the same line, and almost tending, if not entirely, to the same result, that is clear from the testimony you have heard, and that there were experiments known to various persons, but if they rested in experiment only, and had not attained the object for which the patent was taken out, mere experiment afterwards, supposed by the parties to be fruitless, and abandoned because they had not brought it to a complete result, that will not prevent a more successful competitor who may avail himself, as far as his predecessors have gone, of their discoveries, and add the last link of improvements, in bringing it to perfection. If that is the case, the plaintiff is entitled to your verdict. If it was then known, at the time when he took it up, and was publicly known and used in England, then, in that case, the patent is invalid, and, in that case, you would find your verdict for the defendant. If you find it for the plaintiff, it will be only nominal damages; the question is not here for any profits, but simply to decide the rights between the parties.

[The jury without retiring from the box, turned round and consulted together.]

The Foreman.—We have agreed upon our verdict my lord, our verdict is—for the plaintiff.

The Attorney-General.—Will your lordship please to specify about the special jury?

The Lord Chief Justice.—Yes.

The Attorney-General.—Perhaps your lordship will likewise have the goodness to certify under the act, as to the merits of the invention? it is under sec. 5.

Mr. Richards.—Has your lordship this act before you?

The Lord Chief Justice.—I need not certify at court, it can be done at chambers.

LIST OF NEW PATENTS.

WILLIAM CRANE WILKINS, of 'Long Acre, Lamp Manufacturer, and **MATTHEW SAMUEL KENDRICK**, of the same place, Lamp Maker, for certain improvements in lighting and in lamps.—Sealed April 28, 1840.—(*Six months.*)

JOHN INKSON, of Ryder Street, Saint James' Gentleman, for improvements in apparatus for consuming gas for the purpose of light. Communicated by a foreigner residing abroad.—Sealed April 30, 1840.—(*Six months.*)

ORLANDO JONES, of the City Road, Accountant, for improvements in treating or operating on farinaceous matter to obtain starch and other products, and in manufacturing starch. — Sealed April 30, 1840. — (*Six months.*)

WILLIAM PIERCE, of James Place, Hoxton, Ironmonger, for improvements in the construction of locks and keys.—Sealed May 2, 1840.—(*Six months.*)

ARTHUR WALL, of Bermondsey, Surgeon, for a new composition for the prevention of corrosion in metals, and for other purposes.—Sealed May 2, 1840.—(*Six months.*)

THOMAS GADD MATTHEWS, of Bristol, Merchant, and **ROBERT LEONARD**, of the same place, Merchant, for certain improvements in machinery or apparatus for sawing, rasping, or dividing dye woods, or tanners' bark. Sealed May 5, 1840.—(*Six months.*)

WILLIAM NEWTON, of Chancery Lane, Patent Agent, for an improved apparatus and process for producing sculptured forms, figures, or devices in marble, and other hard substances. Communicated by a foreigner residing abroad.—Sealed May 5, 1840.—(*Six months.*)

GEORGE MACKAY, of Mark Lane, Ship Broker, for certain improvements in rotatory engines. Communicated by a foreigner residing abroad.—Sealed May 5, 1840.—(*Six months.*)

WILLIAM BEETSON, of Brick Lane, Old Street, Brass Founder, for improvements in stuffing-boxes applicable to water-closets, pumps, and cocks.—Sealed May 5, 1840. —(*Six months.*)

FRANK HILLS, of Deptford, Kent, Manufacturing Chemist, for certain improvements in the construction of steam-boilers and engines, and of locomotive carriages.—Sealed May 5, 1840.—(*Six months.*)

BERNARD AUBE, of Coleman Street Buildings, Gentleman, for improvements in the preparation of wool for the manufacturer of woollen and other stuffs.—Sealed May 7, 1840.—(*Six months.*)

THOMAS WALKER, of Galashiels, in the county of Selkirk, Mechanic, for improvements in apparatus applicable to feeding machinery employed in carding, scribbling, or teasing fibrous materials.—Sealed May 7, 1840.—(*Six months.*)

HENRY HOLLAND, of Darwin Street, Birmingham, Umbrella Furniture Maker, for improvements in the manufacture of umbrellas and parasols.—Sealed May 7, 1840.—(*Six months.*)

HENRY MONTAGUE GROVER, of Bovency, Buckinghamshire, Clerk, for an improved method of retarding and stopping railway trains.—Sealed May 7, 1840.—(*Six months.*)

MILES BERRY, of Chancery Lane, Patent Agent, for certain improvements in treating, refining, and purifying oils. Communicated by a foreigner residing abroad.—Sealed May 9, 1840.—(*Six months.*)

AUGUSTE MOINAN, of Philpot Terrace, Edgware Road, Clock Maker, for certain improvements in the construction of time-keepers.—Sealed May 9, 1840.—(*Six months.*)

RICE HARRIS, of Birmingham, Gentleman, for certain improvements in cylinders, plates, and blocks used in printing and embossing.—Sealed May 12, 1840.—(*Six months.*)

GEORGE JOHN NEWBERRY, of Cripplegate Buildings, Manufacturer, for certain improvements in rendering silk, cotton, woollen, linen, and other fabrics, waterproof.—Sealed May 12, 1840.—(*Six months.*)

HENRY DIRCKS, of Liverpool, Engineer, for certain improvements in the construction of locomotive steam-engines, and in wheels to be used on rail and other ways, parts of which improvements are applicable to steam-engines generally.—Sealed May 12, 1840.—(*Six months.*)

JOHN DAVIDSON, of Leith Walk, Edinburgh, for an improvement in the method of preserving salt.—Sealed May 12, 1840.—(*Six months.*)

PETER BRADSHAW, of Dean near Rimbolton, Bedford, Gentleman, for improvements in dibbling corn and seed.—Sealed May 12, 1840.—(*Six months.*)

JAMES WALTON, of Sowerby Bridge, Halifax, Cloth

Dresser, for improvements in the manufacture of beds, mattresses, pillows, cushions, pads, and other articles of a similar nature, and in materials for packing.—Sealed May 12, 1840.—(*Six months.*)

RICHARD FOOTE, of Faversham, Kent, Watch Maker, for improvements in alarums.—Sealed May 12, 1840.—(*Six months.*)

JOHN JOSEPH MECHI, of Leadenhall Street, Cutler, for an improved method of lighting buildings.—Sealed May 12, 1840.—(*Two months.*)

BRYAN J'ANSON BROMWICH, of Clifton-on-Teme, Worcester, Gentleman, for improvements in stirrup irons.—Sealed May 13, 1840.—(*Six months.*)

HENRY ERNEST, of Gordon Street, Middlesex, Gentleman, for certain improvements in the manufacture of machines, usually called beer-engines.—Sealed May 13, 1840.—(*Six months.*)

WILLIAM HANNIS TAYLOR, of Norfolk Street, Strand Esquire, for certain improvements in the mode of forming or manufacturing staves, shingles, and laths, and the machinery used for that purpose.—Sealed May 20, 1840.—(*Six months.*)

WILLIAM BUSH, of Camberwell, Merchant, for improvements in fire-arms and in cartridges. Communicated by a foreigner residing abroad.—Sealed May 20, 1840.—(*Six months.*)

JAMES BUCHANAN, of Glasgow, Merchant, for certain improvements in the machinery applicable to the preparing twisting and spinning, and also in the mode of preparing, twisting, and spinning, of hemp, flax, and other fibrous substances, and certain improvements in the mode of applying tar or other preservative to rope and other yarns. Sealed May 22, 1840.—(*Six months.*)

JAMES CALLARD DAVIES, of College Place, Camden Town, Jeweller, for an improved clock or time-piece.—Sealed May 23, 1840.—(*Six months.*)

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